

**PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
PHASE I, II AND III ENVIRONMENTAL SITE ASSESSMENTS
AND ASSOCIATED ACTIVITIES
FOR DEPARTMENT OF FISHERIES AND OCEANS**

**FINAL PHASE I, II AND III
ENVIRONMENTAL SITE ASSESSMENT
MALPEQUE HARBOUR, APPROACH RANGE SITES
LL# 1066, 1067, 1068 and 1069
LDU/PN # 02175, 81101, 02176, 81102
RPIS # MB00064, MB00065, MB00066, MB00067
PRINCE COUNTY, PRINCE EDWARD ISLAND
PROJECT NO. NBF13300-0007**

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REPORT TO

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PRINCE COUNTY, PRINCE EDWARD ISLAND**

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EXECUTIVE SUMMARY

Between August 1, 2001 and November 30, 2001, Jacques Whitford Environment Limited (JWEL) conducted a Phase I, II and III Environmental Site Assessment of the Department of Fisheries and Oceans (DFO) properties located on the Malpeque Harbour Approach Range Lights and the Malpeque Harbour Ranges at Fish Island, Prince County, Prince Edward Island.

Based on the information gathered and on observations made during this investigation, the Phase I, II and III Environmental Site Assessment revealed evidence of potential environmental contamination associated with the subject property. Potential contamination was based on the following:

- potential presence of lead based and/or mercury containing paint on the interior and exterior of LL# 1067, on the daymarks associated with LL#1066, 1068, and 1069, and on the battery box associated with LL#1066;
- potential presence of lead, mercury and other metal impacts in the soil surrounding the existing range lights, the former LL#1067 lamp room roof and side walls, and former structures based on: former and existing potential metal and mercury based paint; reported and potential spills associated with lead batteries for the range lights; the former practice of emptying zinc batteries on-site during routine maintenance activities, and the presence of fill materials;
- potential presence of asbestos containing materials in LL#1067;
- potential presence of petroleum hydrocarbons in the vicinity of: LL# 1066 and 1067 based on the former use of kerosene to fuel the range lights; the former building located approximately 50 meters north of LL#1067 based on reported potential storage of kerosene in the building; and, the camp that was destroyed by fire based on the presence of a five litre fuel container in the remnants.

The corresponding Phase II / III included: soil, paint, and building material sampling to address the above noted issues. Selected soil samples were collected in the vicinity of the range lights and submitted for laboratory analysis of metals, including lead and mercury. Selected soil samples were also analyzed for TPH/BTEX. Selected paint samples were collected from the range lights and were submitted for laboratory analysis of metals (including lead) and mercury. Selected building materials collected from LL # 1067 were submitted to the laboratory for asbestos analysis.

Results are as follows:

- lead, zinc and mercury concentrations above the CCME commercial values were found in soil samples on the 1 m and 10 m ring around LL#1067, as well as at three soil sample locations in the vicinity of LL#1067 where the potential for contamination was suspected based on the presence of fill material and a portion of the former LL#1067 structure. The volume of contaminated soil is estimated as 175 m³. Further on site delineation would be required to delineate one area;
- paint at LL#1067 and LL#1066 exceed the Hazardous Products Regulations for lead of 5,000 mg/kg

in five of the samples collected. The areal extent of the lead-based paint is estimated to be 200 m². The paint is not considered leachate toxic waste based on analysis of the two paint samples having the largest exceedance of 5,000 mg/kg lead;

- asbestos-containing materials were found on the interior fourth storey of LL#1067. Asbestos-containing materials included floor and wall board based on analysis of two building material samples. The ceiling, which could not be sampled during the site visit, appeared to be similar to the wall board and therefore, has been assumed to be asbestos-containing. New and old asphalt shingle samples were not collected at the time of the site visit. Asphalt shingle samples should be collected during follow-up work and be analyzed for asbestos content. Should asbestos be confirmed to be present then the shingles could be included in clean up of other site asbestos with minimal cost. Approximate area of asbestos-containing materials associated with LL#1067 is estimated to be 50 m²; and
- soil petroleum hydrocarbon concentrations were all below applicable criteria.

The ruin, which reportedly was potentially a former kerosene storage building could not be located. It is possible the ruin is no longer present due to shore line erosion.

The CCME National Classification System (NCS) detailed evaluation form was completed and the site was classified as Class 2, action likely required with a Final Score of 69 ± 7 . The Marine and Aquatic Site Ranking method was not conducted as the site does not have a water lot associated with it.

The statements made in this Executive Summary are subject to the same limitations included in the Closure Section 6.0, and are to be read in conjunction with the remainder of this report.

1.0 INTRODUCTION

Jacques Whitford Environment Limited (JWEL) was commissioned by Ms. Heather McCleave, P.Eng. of Public Works and Government Services Canada (PWGSC), on behalf of the Department of Fisheries and Oceans (DFO), to complete a Phase I, II and III Environmental Site Assessment (ESA) on the DFO property known as the Malpeque Harbour Approach Range Sites, located on Fish Island, Prince County, Prince Edward Island (Figure No. 1).

1.1 Objectives

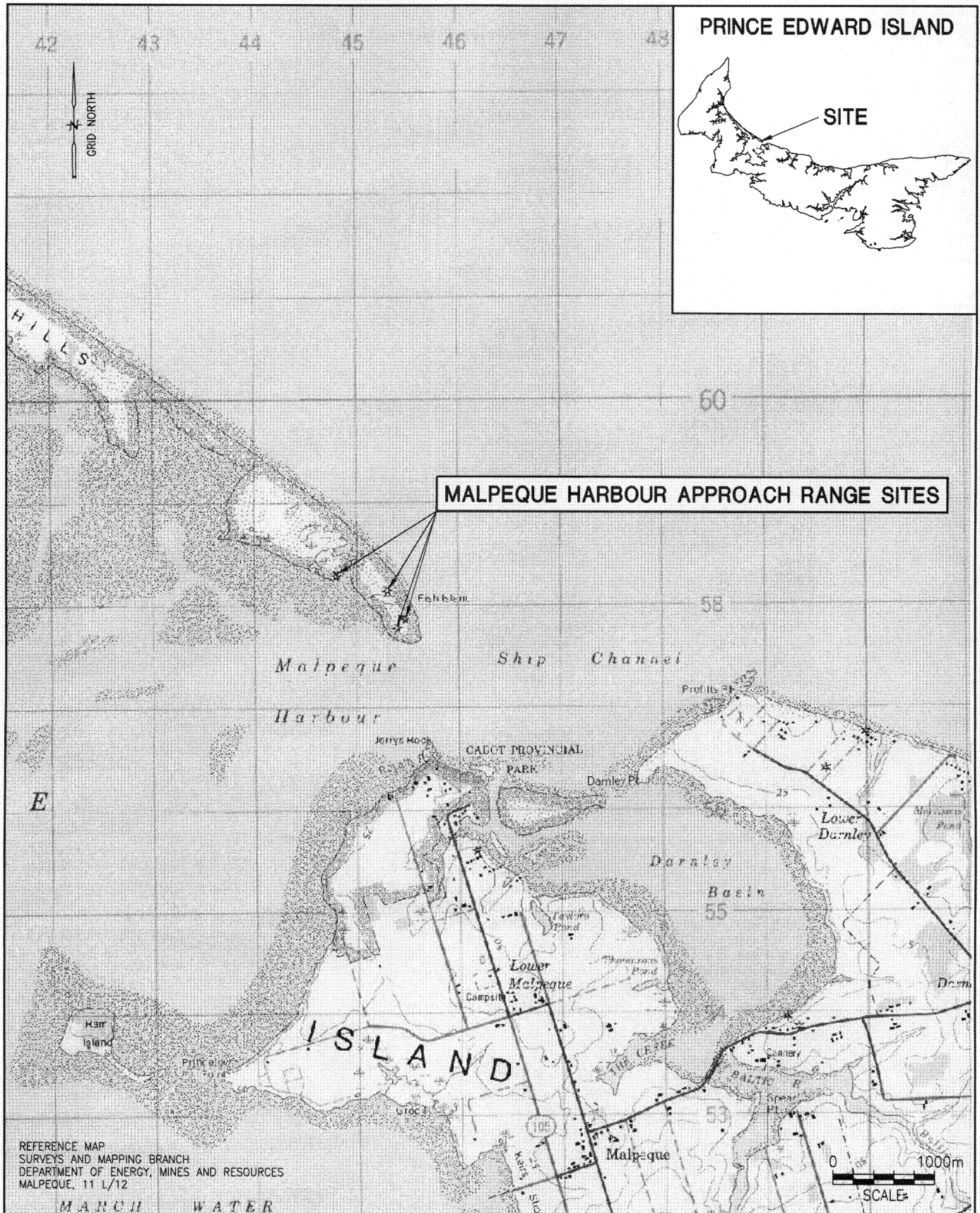
This work has the following general objectives:

- To conduct a CCME Phase I ESA to identify and document potential sources of contamination in soil, sediment, groundwater and/or surface water;
- To conduct a CCME Phase II ESA to confirm the presence or absence of contamination related to the potential sources identified in the Phase I ESA;
- To complete a detailed intrusive investigation (Phase III ESA) to identify the source, nature and extent (horizontal and vertical) of contamination in all impacted media;
- To summarize the contaminated sites on the property and complete the detailed evaluation from the National Classification System for Contaminated Sites, Canadian Council of Ministers of the Environment (CCME), March 1992;
- To develop a Marine and Aquatic Sites Ranking for the site, if applicable;
- To provide input data for DFO's RPIS Contaminated Sites Module;
- To develop a remedial action plan for the remediation and/or risk management of the contaminated sites on the property;
- To prepare a scope of work and cost estimate for any additional work requirements; and
- To develop an indicative estimate of financial liability or contingent liability for all contaminated sites on the property.

The latter three bullets are not addressed in this report, but are provided as attachments.

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FILE: \13300\07 MALPEQUE HARBOUR\MALPEQUE_HARBOUR_FIG1



REFERENCE MAP
SURVEYS AND MAPPING BRANCH
DEPARTMENT OF ENERGY, MINES AND RESOURCES
MALPEQUE, 11 L/12

<p>SITE LOCATION PLAN MALPEQUE HARBOUR APPROACH RANGE SITES PRINCE COUNTY, PEI, LL# 1066, 1067, 1068, 1069 LDU/PN# 02175, 81101, 02176, 081102 RPIS# MB00064, MB00065, MB00066, MB00067 DEPARTMENT OF FISHERIES AND OCEANS</p>	<p>Date: 02 01 14</p> <p>Job No.: 13300-07</p>	<p>Scale: 1 : 50 000</p> <p>Figure No.: 1</p>	<p>Jacques Whitford Consulting Engineers Environmental Scientists</p> <p><small>THIS DRAWING IS THE PROPERTY OF JACQUES WHITFORD AND IT SHALL NOT BE GIVEN OUT, COPIED OR DUPLICATED FOR THE USE OF ANOTHER BUT SHALL BE USED ONLY BY THE RECIPIENT FOR THE PURPOSE TO WHICH IT REFERS.</small></p>
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1.2 Regulatory Framework

Applicable federal, provincial and municipal regulations were reviewed to develop appropriate recommendations. It should be noted however, that this assessment did not include a review or audit of operational environmental compliance issues, or of any environmental management system (EMS) which may be in place at the property. Where required, the documents listed in Appendix D were used as reference material for the completion of this report.

1.2.1 Paint

In 1976, the lead content in interior paint was limited to 0.5% (5000 mg/kg) by weight under the federal Hazardous Products Act. Health Canada has established home renovation guidelines of 1 mg/cm² for children and pregnant women, and 5 mg/cm² as constituting heavily leaded paint.

No Canadian guideline levels for comparison have reportedly been established for mercury in paint. Prior to 1990, the U.S. Environmental Protection Agency (EPA) permitted interior latex paint to contain up to 300 ppm elemental mercury and exterior latex paint to contain up to 2000 ppm. In 1990, the U.S. EPA mandated the elimination of mercury in interior latex paint (EPA Environmental News, US EPA Communications and Public Affairs, A.107, June 29, 1990). Since 1990, the National Paint and Coatings Association has worked with the paint manufacturers to re-label all paints with mercury levels over 200 ppm for exterior use only.

1.2.2 Asbestos Containing Materials

Currently, the provinces of Prince Edward Island, Nova Scotia and New Brunswick regulate the use and disposal of asbestos containing material both through legislation, codes and guidelines. In general, asbestos containing materials with asbestos content over 1 % must be managed appropriately.

1.2.3 Soil

The subject property is on federal land and therefore the primary source of remediation criteria is the Canadian Council of Ministers of the Environment (CCME) Soil Quality Guidelines for the Protection of Environmental and Human Health (CCME, 1999). DFO requested that the site be considered commercial. Therefore, the appropriate guidelines for this site are defined by the commercial values. TPH criteria are not included in the CCME Guidelines, hence the Atlantic Canada Partnership in RBCA Implementation (PIRI) Risk Based Screening Levels (RBSLs) were used.

1.2.4 Leachate Criteria

Leachate results are compared to the limits defined in the Transportation of Dangerous Goods Act (5 mg/L for lead) to determine if the material is classified as leachable toxic waste.

2.0 PHASE I ENVIRONMENTAL SITE ASSESSMENT

2.1 Scope of Work

The purpose of the Phase I ESA was to identify any actual or potential environmental contaminants associated with the subject property which may exist as a result of current or past activities. The Phase I ESA component of this report was based on the requirements of the Canadian Standards Association (CSA) Phase I Environmental Site Assessment Information Product, Z768-94, April 1994, and consists of the following:

- records review;
- interviews with and/or written requests to regulatory officials and personnel associated with the subject and adjoining properties;
- a site visit; and
- evaluation of information and preparation of the report provided herein.

A Phase I ESA does not include sampling or testing of air, soil, groundwater, surface water or building materials. These activities would be carried out in a Phase II ESA, if required.

The professional qualifications of the Phase I Site Assessor and Senior Reviewer are provided in Appendix A.

2.2 Methodology

2.2.1 Records Review

The applicable search distance for the records review included properties immediately adjoining the subject property and those (as identified by aerial photographs, insurance records, etc.) where the potential for environmental contamination to impact the subject property was apparent (e.g., petroleum product storage in the immediate area).

A list of records reviewed is provided in Appendix C.

2.2.2 Interviews

Interviews with George Craig and Charlie MacDonald, of DFO/CCG Charlottetown, and Eric Topple, DFO/CCG Dartmouth, were carried out to obtain or confirm information on the environmental characteristics of this property. A summary of interviewees and contact information, questions and responses are presented in Appendix C. Information from interviews is discussed in the relevant sections.

2.2.3 Site Visit

The subject property and readily visible and publicly accessible portions of adjoining neighbouring sites were examined for the presence of actual or potential environmental contamination. All areas of the property and subject buildings were accessible during the site visit; however, due to the size of the subject property, only a representative portion of the subject property was visually assessed. Weather conditions at the time of the site visits were sunny with light to moderate winds.

2.3 Site Description

2.3.1 Subject Property Description

The subject properties are located on Fish Island in Prince County, Prince Edward Island, and are legally described as Property Identification (PID) Nos. 553701, 553727, and 553719 (Figure No. 2). PEI Geomatics Information Centre records indicate that the Government of Canada owns the subject properties. PEI Geomatics Information Centre records also indicate that PID 553719 has one lease to the Government of Canada registered to it.

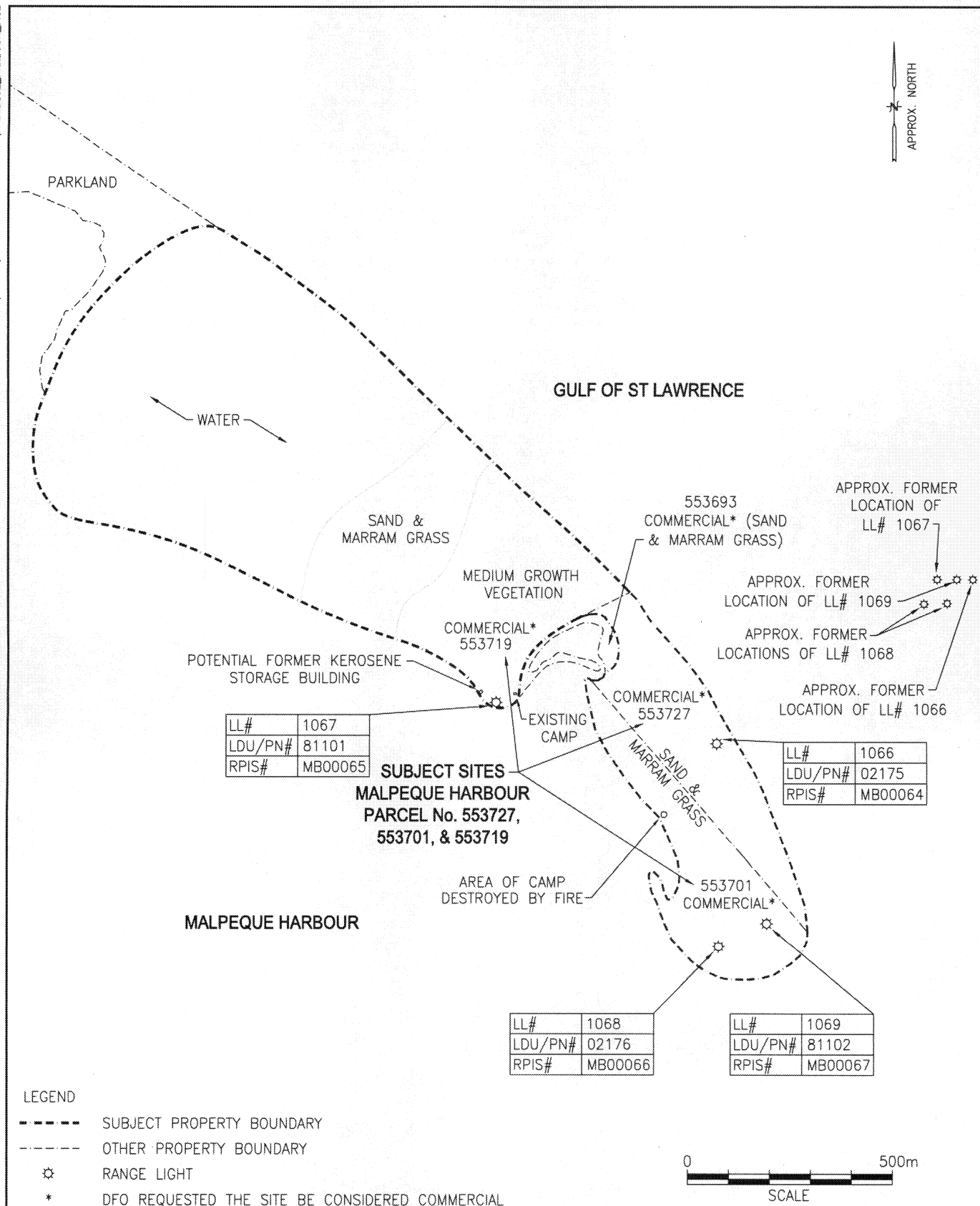
Selected aerial photographs have been provided in Appendix B. At the time of the site visit, four range lights, consisting of three day marks and one four storey range light, as well as a camp building were observed on the subject property. The camp building is reportedly not owned by DFO and is therefore suspected to be privately owned. Sand and marram grass covered the south-eastern portion of the subject property and low to medium growth vegetation and grasses covered the north-western portion of the subject property. Selected photographs of the site are shown on Figure 3.


DFRP information for this property is as follows:

LDU/Property Number:	02176 (front), 81102 (rear), 02175 (approach front), 81101 (approach rear)
Custodian:	Fisheries and Oceans (CCG)
Type of Interest:	all crown-owned, excluding 81101 which is occupied without an interest
Number of Structures:	0
Area in hectares:	0.4047 (front), 0.4047 (rear), 16.194 (front approach), 0.81 (approach rear)

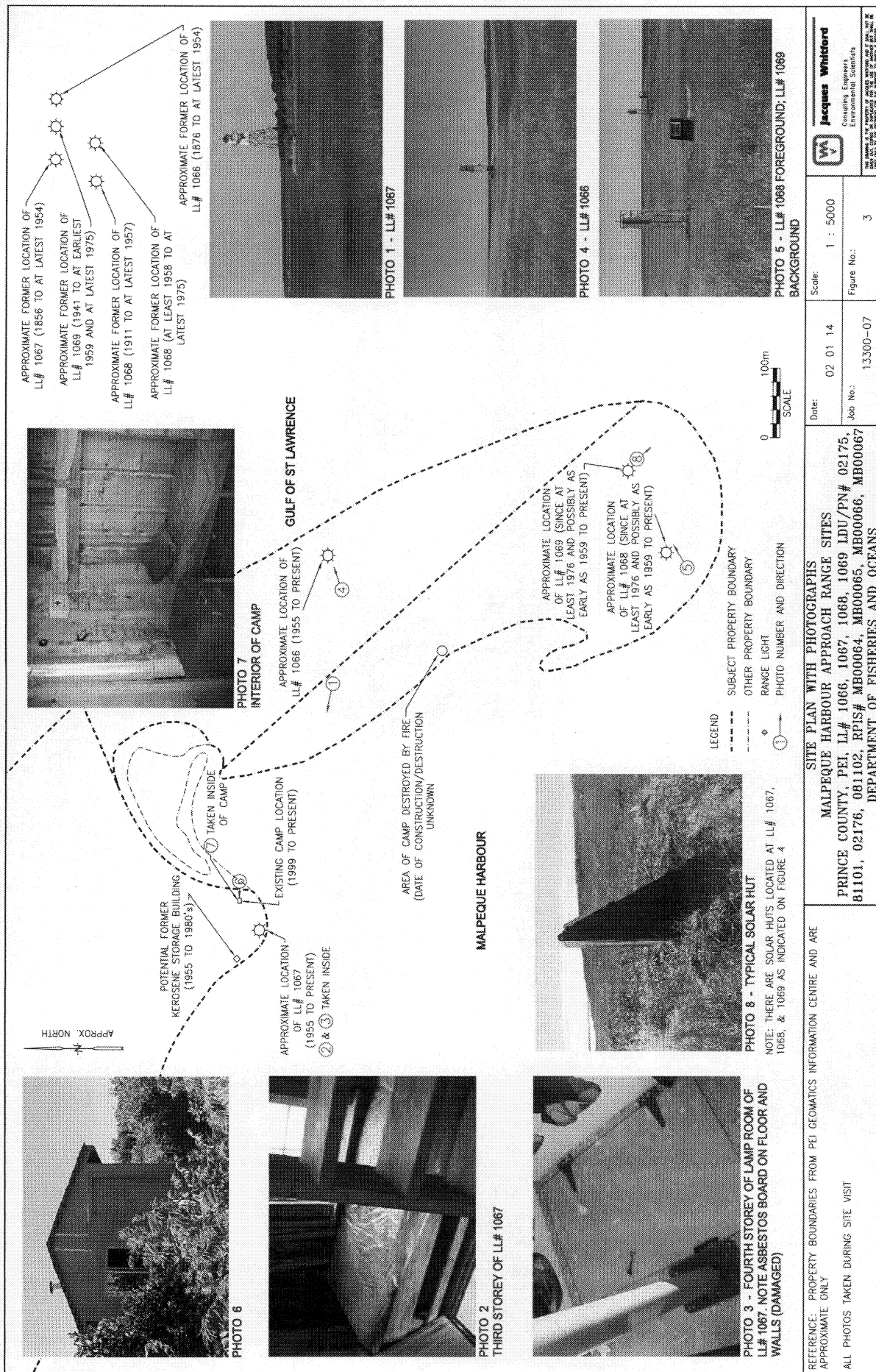
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FILE: \13300\07 MALPEQUE HARBOUR\MALPEQUE_HARBOUR_FIG2



PROPERTY PLAN MALPEQUE HARBOUR APPROACH RANGE SITES PRINCE COUNTY, PEI, LL#1066, 1067, 1068, 1069, LDU/PN #02175, 81101, 02176, 81102 RPIS#MB00064, MB00065, MB00066, MB00067 DEPARTMENT OF FISHERIES AND OCEANS	Date:	02 01 14	Scale:	1 : 12500	 Jacques Whitford Consulting Engineers Environmental Scientists
	Job No.:	13300-07	Figure No.:	2	

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REFERENCE: PROPERTY BOUNDARIES FROM PEI GEOMATICS INFORMATION CENTRE AND ARE APPROXIMATE ONLY

ALL PHOTOS TAKEN DURING SITE VISIT

SITE PLAN WITH PHOTOGRAPHS
MALPEQUE HARBOUR APPROACH RANGE SITES
PRINCE COUNTY, PEI, LL# 1066, 1067, 1068, 1069 LDU/PN# 02175, 81101, 02176, RPIS# MB00064, MB00065, MB00066, MB00067
DEPARTMENT OF FISHERIES AND OCEANS

Date: 02 01 14

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Figure No.: 3



Jacques Whitford
Consulting Geomatics
Environmental Scientists

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Provincial property information for this site is provided in Appendix C. The DFRP and provincial property information is compared in Table 1. The provincial property information was used to represent property boundaries on the associated figures.

Table 1 - Comparison of DFRP and Provincial Property Information

Property	Aerial Extent (hectares)		Ownership	
	DFRP	Provincial Property Information	DFRP	Provincial Property Information
Front Range LL #1068	0.4047	same property for both rear and front ranges 12.9504	Crown	Government of Canada
Rear Range LL# 1069	0.4047		Crown	Government of Canada
Approach Front Range LL # 1066	16.1940	31.9713	Crown	Government of Canada
Approach Rear Range LL # 1067	0.8100	67.1802	Occupied without an interest	Government of Canada

2.3.2 Water Supply/Groundwater Usage

There is no known water supply or groundwater use on the subject or adjoining properties. There are no known septic fields located on the subject property.

2.3.3 Soil, Topography and Drainage

Based on available surficial geology maps, the native surficial soils at the site likely consist of silt, sand, and minor gravel. The characteristic permeability of these soils is moderate. Site specific testing of subsurface soils would be required to obtain more detailed soil permeability information for the site. Bedrock in the area consists of redbeds made up of conglomerate, sandstone and siltstone. Regional surface drainage appears to be towards both the Gulf of St. Lawrence and the Malpeque Harbour, which surround the subject property. The regional groundwater flow is tidally affected, therefore, flow direction would vary according to tidal stage. Surface drainage at the site appears to follow the general slope of the property, which is generally directed towards the surrounding water bodies. However, the southern portion of the subject property has sand dunes along the property boundaries which would direct surface drainage to the central area of the southern portion of the subject property. Areas of the north-western portion of the property were covered by standing water. These areas may act as a watercourse between Malpeque Harbour and the Gulf of St. Lawrence.

Fill material observed surrounding and to the north of LL#1067 represents a potential source of environmental contamination.

Erosion protection was observed to have been placed along the base of the cliff to the south of LL#1067. The erosion protection consisted of a gabion wall.

Wells, pits, lagoons, stressed vegetation, or ditches were not observed on the subject properties.

2.3.4 On-Site Buildings and Structures

The subject property was occupied by four range lights, three solar huts, and a camp. Three of the range lights (LL#1068, 1069, and 1066) were skeleton steel towers with wooden daymarks (white with a red vertical stripe) and a light on top of them. A vertical steel ladder was fixed to the skeleton steel towers and enabled access to the steel grate landing, located at the top of the range light, which provided access to the light and the daymark. The skeleton steel range lights had timber skid foundations. The fourth range light (LL#1067) had a two storey metal frame as a base with a two storey wooden enclosed structure on top of it. The range lights were powered by solar energy, which primarily consisted of solar panels and batteries. The batteries for LL#1067, 1068, and 1069 were stored in nearby solar huts, while the batteries for LL#1066 were stored in a red wooden box fixed to the skeleton steel tower.

A metal ladder-type staircase, having a metal landing between the first and second storey, enabled access to the third storey of LL#1067. The third storey of LL#1067 had an unfinished interior and a wooden ladder-type staircase, which enabled access to the fourth storey. A make-shift bed, consisting of fibreglass batt insulation, plastic, and a wooden frame, was observed on the third floor. The interior fourth storey had white painted asbestos board sheathing, which had reportedly been vandalised. Large holes were observed in the asbestos wall sheathing. The floor of the fourth storey was unpainted grey asbestos board. The light for the range was located on the fourth storey. A wooden catwalk having a metal railing was located on the exterior fourth storey of the structure. Painted areas of LL#1067 consisted of the steel framing and ladder-type stair case, the exterior of the upper wooden enclosed portion, and the catwalk steel railing. The roof was covered with asphalt shingles.

The solar huts were made of prefabricated steel, having a brown baked on enamel finish, and white wooden doors. Solar panels were fixed to the exterior of the solar huts and the batteries were stored on a shelf in the interior of the huts. A solar regulator was observed to be fixed to the interior wall of each solar hut. The solar hut associated with LL#1068 appeared to have been submerged with sea water as seaweed and sand were observed inside the solar hut.

The camp had a wooden frame and an unfinished interior. Four bunk beds, a space heater, cooking appliances, and general domestic equipment were observed in the camp. The exterior of the camp was painted beige, the roof was covered with asphalt shingles, and the foundation consisted of wooden blocks.

None of the subject buildings or structures had basements or were insulated. At the time of the site visit, navigational activities were operational and the camp was unoccupied. A summary of property and building information is presented in Table 2.

Table 2 - Summary of Lot and Building Information

Subject Property		
Max Length, Max Width	Approximately 2,330 m, 765 m	
Area	Approximately 115 ha	
Services: Sewer, Water, Electricity	No known sewer or water services. The site has above ground and underground electricity.	
Buildings		
	LL#1066	LL#1067
Date Constructed	1987	1959
Max Length, Max Width	4.5m. 1.5 m	Approximately 5m, 5m
Number of Storeys	N/A	Four
Foundation	Pressure-treated timber skid	Concrete pier
	LL #1068	LL#1069
Date Constructed	1959	1959
Max Length, Max Width	4.5m. 1.5 m	4.5m. 1.5 m
Number of Storeys	N/A	N/A
Foundation	Pressure-treated timber skid	Pressure-treated timber skid
	Camp	Solar Huts
Date Constructed	Estimated 1999	Mid 1980's
Max Length, Max Width	Approximately 3.5 m, 2.5 m	Approximately 1.9 m, 1.4 m
Number of Storeys	One	One
Foundation	Wooden blocks	Creosote timber
Basement	None	None
HVAC	A space heater was observed in the camp.	None

2.3.5 Adjoining Properties

Land use associated with the adjoining properties generally includes water bodies and parkland as shown on Figure No. 2 and in Table 3.

Table 3 - Adjoining Properties - Current Land Use

Boundary Side of Site	Current Activity	Potential Sources of Contamination			
		AST	Fill or Vent for Suspected AST	Fill or Vent for Suspected UST	Other
North	Gulf of St. Lawrence	None observed	None observed	None observed	None observed
South	Parkland and Malpeque Harbour	None observed	None observed	None observed	None observed
East	Gulf of St. Lawrence	None observed	None observed	None observed	None observed
West	Malpeque Harbour	None observed	None observed	None observed	None observed

Potential environmental contamination from adjoining properties observed on site during the site visit are discussed in the relevant section of Section 2.6.

2.4 Historical Land Use

2.4.1 Subject Property

Historical information describing the subject properties was obtained from a variety of sources as detailed in Appendix C. A list of historical land uses for the subject property is provided in Table 4.

Table 4 - Historical Information for the Subject Property

Period/Date	Land Use	Sources of Information
1876 to 1959	<p>The subject property has been historically used for navigational aid and parkland activities.</p> <p>In 1856, a fixed range light LL#783 (original LL#1067) was established and was the main light until 1876 when it became the back light of the outer range. The original LL#1067 had a white square wood structure with a dwelling attached. The original LL#1067 had a white light.</p> <p>In 1876, a fixed range light LL#784 (original LL#1066) was established and acted as front light of the outer range and from 1911 to 1941 also acted as the back light of the inner range. The original LL#1066 had a white open framework structure surmounted by a square galvanized lantern and was noted as having a red light for its inner range role and a white light for its outer range role.</p> <p>In 1911, a fixed range light LL#785 (original LL#1068) was established and acted as the front light of the inner range. The original LL#1068 consisted of a pole with a small white shed at the base and was noted as having a red light.</p> <p>In 1941, a fixed range light LL#785.5 (original LL#1069) was established and acted as the back light of the inner range. The original LL#1069 consisted of a pole and was noted as having a red light.</p> <p>Prior to at the latest 1954, the positions of LL#1066 and LL#1067 in the List of Lights Books would be in the Gulf of St. Lawrence. A 1955 aerial photograph positioned the original LL# 1066 and 1067 in approximately their existing locations.</p> <p>The 1955 aerial photograph also indicated that a separate building was located approximately 50 meters north of the original LL#1067. CCG employees indicated that the separate building may have been for kerosene storage.</p> <p>Records from 1958 indicate the current positions of the original LL#1068 and 1069 would be in the Gulf of St. Lawrence.</p>	CCG records, Interview with George Craig and Charlie MacDonald, and aerial photographs.

Table 4 - Historical Information for the Subject Property

Period/Date	Land Use	Sources of Information
1959 to approximately 1987	<p>In 1959, the original LL# 1067 structure was replaced with the existing red skeleton tower with a white enclosed upper portion.</p> <p>It is expected that in 1959, the original LL#1066 was replaced with a white tower structure (former LL#1066) having a white light.</p> <p>Also in 1959, the original LL# 1068 and 1069 structures were replaced with steel skeleton towers painted red, with white rectangular daymarks, having a fluorescent red diamond in the centre (former LL#1068 and 1069). Records from 1976, indicate the former LL#1068 and 1069 structures were positioned in approximately their existing locations. Their location during the period of 1959 to 1975 is not known; however, it is expected they were positioned in approximately their existing locations.</p>	CCG records, interview with Charlie MacDonald, and aerial photographs.
Approximately 1980's to 1999	<p>A 1980 aerial photograph confirmed the presence of the potential kerosene storage building located to the north of LL#1067; however, this structure was not observed in the 1990 aerial photo. Therefore, it appears that the potential former kerosene storage building was demolished between 1980 and 1990. The ruin reportedly still exists; however, JWEL was unable to locate it during their site visit. However, based on the erosion observed in the aerial photos and during the site visit, it is possible this structure was undermined and subsequently destroyed by the erosion of the shore line.</p> <p>In the 1980's the former LL#1068 and 1069 were replaced with the existing galvanized steel tower structures having white wooden daymarks with a red vertical stripe.</p> <p>Solar power was reportedly installed on the towers in 1985-86. The existing solar huts were reportedly constructed beside LL#1067, 1068, and 1069.</p> <p>In 1987 a severe fall storm washed out the sand beneath the former LL#1066, which left it on the beach and slanted at a reported 10 degree angle. The existing LL#1066 was constructed and the former LL#1066 was given to the Malpeque Historical Society and it is now located at Cabot Park approximately 2.5 kilometres south of the subject property. One of the conditions of transfer of the former LL#1066 to the Malpeque Historical Society was "no light is to be installed in the lantern that can be seen from seaward", therefore, it is not expected that the former LL#1066 is operational.</p>	CCG records, interviews with Charlie MacDonald and George Craig and aerial photographs.
1999 to present	<p>In 1999, a camp was constructed on the subject property approximately 50 m northeast of LL#1067.</p> <p>A former camp, which appeared to have been destroyed by fire, was observed on the subject property. The location of the area of camp destroyed by fire is shown on Figure 3. The date of the former camp's construction or of its destruction is not known.</p> <p>The navigational aids remain operational.</p>	Site visit and aerial photographs.

Potential sources of environmental contamination from historical activities on the subject property, identified during the historical review, are discussed in the relevant subsection of Section 2.6.

2.4.2 Adjoining Properties

A list of historical land uses for the adjoining properties is provided in Table 5.

Table 5 - Historical Information for the Adjoining Properties

Boundary Side of Site	Historical Activity	Potential Historical Sources of Contamination	Sources of Information
North	Gulf of St. Lawrence	None	Aerial photos, Site visit
South	Parkland and Malpeque Harbour	None	Aerial photos, Site visit
East	Gulf of St. Lawrence	None	Aerial photos, Site visit
West	Malpeque Harbour	None	Aerial photos, Site visit

Potential sources of environmental contamination to the subject property from adjoining properties, identified during the historical review, are discussed in the relevant subsection of Section 2.6.

2.5 Regulatory Requests

2.5.1 Provincial

Information obtained from the Prince Edward Island Department of Fisheries, Aquaculture and Environment (PEIDFAE) is presented in Appendix C and is discussed in the relevant subsection of Section 2.6.

2.5.2 Federal

An information request was submitted to Environment Canada by PWGSC with regards to the subject property. Three sources of information were searched; the Office of Enforcement, Environmental Emergencies Section, and Waste Management and Remediation Section. Relevant information is presented in Appendix C and is discussed in the appropriate subsection of Section 2.6.

2.6 Site Visit and Evaluation of Findings

2.6.1 Fuel Handling and Storage

A review of the Canada Coast Guard, Maritime Region, Petroleum System Upgrade Program inventory indicates that no tanks requiring registration under the Canadian Environmental Protection Act (CEPA) are located on this site. CEPA requires all underground storage tanks and any aboveground storage tank greater than 4000 liters be registered.

The PEIDFAE reported that no petroleum storage tanks are currently registered at the subject or adjoining properties.

No evidence of fill and/or vent pipes indicating the possible presence of underground storage tanks was observed on the subject property during the site visit.

Two 20 litre (L) plastic containers of petroleum hydrocarbon liquid were observed on the exterior south side of the camp. One plastic container was on the soil and the other plastic container was on a wooden board. One petroleum hydrocarbon stainless steel above ground storage tank (AST), approximately 6.5 L, was observed to be fixed to the southern exterior wall of the camp. No staining was observed in the vicinity of the petroleum hydrocarbon storage and storage containers appeared to be in good condition.

Two domestic propane ASTs were observed to have been placed on a wooden board on the south side of the camp.

Based on the presence of a light keeper or caretaker on the subject property up to 1960's, it is expected the range lights were formerly fuelled by kerosene. Caustic-Soda (zinc plated) batteries were used to fuel the range lights from approximately the late 1960's to the 1980's. Since the 1980's, the range lights have been solar powered. Twenty-four batteries, six batteries per range light, were observed on site at the time of the site visit. No staining was observed in the vicinity of the batteries and the batteries appeared to be in good condition.

According to Charlie MacDonald, a District Engineer with the Coast Guard, kerosene may have been stored in the building formerly located approximately 50 m north of LL#1067. The building had been located on the subject property as early as 1955 and since at least 1980. This area is believed to be the location of the ruin that George Craig, a navigational aids technician had spoken about. JWEL could not locate the ruin and/or area of the former potential kerosene storage building during the Phase I/II/III ESA field work. However, based on potential shore line erosion, it is possible this location was undermined and is no longer present.

A small metal fuel container (approximately 5 L) was observed in the remnants of the camp that was destroyed by fire.

2.6.2 Chemicals

Domestic cleaning supplies and insect repellent were observed in the camp. The storage or use of these chemicals is not expected to represent a significant environmental concern at this time.

2.6.3 Waste Management

The PEIDFAE reported that they have no record of any non-compliant environmental issues, outstanding charges or Ministerial Orders, registered underground petroleum storage tanks, or operating air quality permits for the subject or adjoining properties. Environment Canada (Atlantic Region) Sections (Pollution Control; Environmental Emergencies; Waste Management & Remediation) and the Office of Enforcement searched their records for this site and did not identify any environmental concerns.

According to CCG/DFO employees, former Caustic-Soda batteries, which contained a zinc plate, were often drained on site.

Portions of wire mesh, similar to that used for the erosion protection gabion walls, was observed in the medium to high growth vegetation located to the north of LL#1067.

Non-hazardous building materials, such as wood, steel, and other waste debris, were observed to be located 75 m south of LL#1066. The waste building materials appeared to have either blown or drifted to its observed location. It is possible the building materials originated from the camp destroyed by fire. The suspected metal lantern room roof and side walls of the former LL#1067 structure was observed to be located approximately 24 m north of LL#1067 in medium to high growth vegetation. Potential former paint on the structure may have resulted in surrounding soil contamination.

Waste construction debris, primarily shingles and wood from what appeared to be the former catwalk, was observed in the vicinity of LL#1067. The waste debris appeared to have been recently discarded. Based on this it is expected that the shingles observed on LL#1067 were recently installed. New and old asphalt shingles were observed in the waste debris.

2.6.4 Spill and Stain Areas

No spills or stained areas were observed on site during the site reconnaissance, however, as mentioned in Section 3.4.2, liquid from batteries may have been disposed of onsite. George Craig indicated that 10 years ago, the solar hut associated with LL#1069 tipped over and lead/acid electrolyte from the batteries within spilled out. This represents a potential source of soil contamination.

2.6.5 Lead

In 1976, the lead content in interior paint was limited to 0.5% by weight under the federal Hazardous Products Act. Lead is also associated with plumbing solder and old pipes, as well as other lead-based products such as wall shielding (x-ray rooms). Based on the age of the existing structures on the subject property, excluding the existing camp, lead-based paint may be present. Lead-based paint may have

been present on former structures, such as the former range lights, the former attached dwelling to LL#1067, the former potential kerosene storage building, the former LL#1067 metal lantern room roof and side walls, and the camp destroyed by fire.

Potential lead-based paint may have impacted the surrounding soils.

Lead and zinc batteries were reportedly used on site. According to George Craig and Charlie MacDonald, former Caustic-Soda batteries and lead batteries may have been historically drained or disposed of onsite. No evidence of discarded batteries was observed during the site visit.

Fill material observed surrounding and to the north of LL#1067 represents a potential source of soil metal contamination.

2.6.6 Mercury

Historically the range lights associated with the subject property were reportedly fixed and there was no evidence of mercury baths in the existing range lights. Further, George Craig indicated that mercury vapour lamps were likely not used at this site due to the power requirements for mercury vapour lighting; however, Eric Topple thought that it was possible mercury vapour lights were used in LL#1066 and LL#1067.

Based on the age of the subject buildings, interior and exterior mercury containing paint may be present. Former structures may have also had mercury containing paint. Potential mercury containing paint may have impacted the surrounding soil.

2.6.7 Wastewater Discharges

Wastewater is not produced or discharged at the subject property from the range lights.

The former dwelling attached to the original LL#1067 structure and/or the former building located 50 m north of the former LL#1067 structure represent potential former sources of domestic wastewater discharges. There are no known septic tanks or fields on the subject property.

No indication of sewage generation/disposal associated with the camp was observed at the time of the site visit.

2.6.8 Air Emissions

Site related air emissions were not observed on the subject property or identified in the records review or during the interviews. Visible evidence of mould was not observed in the subject buildings.

2.6.9 Polychlorinated Biphenyls (PCBs)

The past use of PCBs in electrical equipment such as transformers, fluorescent lamp ballasts, and capacitors was common. The federal *Environmental Contaminants Act*, 1976, prohibited the use of PCBs in heat transfer and electric equipment installed after September 1, 1977, and in transformers and capacitors installed after July 1, 1980.

Lamp Ballasts

The range lights have incandescent lights and do not have ballasts. George Craig did not recall any use of vapour lamps (that would have used ballasts) at this site.

Transformers

No transformers were observed or reported to be located on the subject property.

PCB Storage Facility

There was no PCB storage facility located on this site.

2.6.10 Asbestos

The use of friable asbestos in the construction industry, including thermal insulation, spray-on fireproofing, certain mixtures such as acoustic ceiling grouts, etc. was voluntarily stopped for most materials in 1978-79. Manufacturers continued to use asbestos in their products until stockpiles were used up (late 1980s). Asbestos is still used in the manufacture of some asphalt roofing shingles. It was not until 1985 that other ACMs were banned including floor tiles, linoleum and other sheet goods. Since that time, asbestos has continued to be an integral part of some building materials, but is typically found below a concentration of 1%. The sprayed application of asbestos-containing fireproofing was not prohibited until 1986.

Currently, all Atlantic Canadian provinces regulate the use and disposal of asbestos containing materials both through legislation, codes and guidelines. In general, asbestos containing materials with asbestos content over 1% must be managed appropriately.

Potential asbestos containing materials (ACMs) observed on site during the site visit were the floor, wall and ceiling boards located on the fourth storey of LL#1067. Waste construction debris, including shingles were observed to have been recently discarded in the vicinity of LL#1067. New and old asphalt shingles which may contain asbestos were observed in the waste debris. George Craig indicated that the asbestos board located in the fourth storey of LL#1067 was painted white and later smashed in by vandals.

2.6.11 Urea Formaldehyde Foam Insulation (UFFI)

The sale and installation of UFFI as thermal insulation began in approximately 1970, and continued until December 1980 when it was banned under the federal *Hazardous Products Act*. UFFI was installed in both new and existing buildings during this period.

The commercial use of UFFI was prohibited in 1985 as described by the Federal Hazardous Products Act. Evidence of UFFI was not observed during the site visit or identified in the records review or during the interviews.

2.6.12 Ozone Depleting Substances (ODSs)

Equipment or appliances that could contain ODSs were not observed on the subject property during the site visit. [REDACTED] indicated that in general chlorobromomethane was formerly commonly used as a fire extinguishing agent in range lights. However, historic use of chlorobromomethane is unlikely to represent an environmental concern for the subject property.

2.6.13 Radon

Radon gas is a product of the decay series that begins with uranium. Radon is produced directly from radium, which can be commonly found in bedrock that contains black shale and/or granite. Radon gas can migrate through the ground and enter buildings through porous concrete or fractures. Radon tends to accumulate in poorly ventilated basements.

No testing for radon gas or its breakdown products has reportedly been completed for the subject property. However, based upon the local geology, significant levels of radon gas or its breakdown products are not expected.

2.6.14 Electromagnetic Fields (EMFs)

No high tension transmission lines or electrical substations which could generate significant electromagnetic fields were identified near the subject property.

2.6.15 Noise and Vibration

Major sources of noise or vibration were not identified on the subject or adjoining properties during the site visit or identified in the records review or during the interviews.

2.6.16 Dredging

Dredging is not an issue at this site.

3.0 PHASE II/III ENVIRONMENTAL SITE ASSESSMENT

3.1 Scope of work

A Phase II/III ESA sampling program was carried out based on the following Phase I findings:

- potential presence of lead based and/or mercury containing paint on the interior and exterior of LL# 1067, on the daymarks associated with LL#1066, 1068, and 1069, and on the battery box associated with LL#1066;
- potential presence of lead, mercury and other metal impacts in the soil surrounding the existing range lights, the former LL#1067 lamp room roof and side walls, and former structures based on: former and existing potential metal and mercury based paint; reported and potential spills associated with lead batteries for the range lights; the former practice of emptying zinc batteries on-site during routine maintenance activities, and the presence of fill materials;
- potential presence of asbestos containing materials in LL#1067; and
- potential presence of petroleum hydrocarbons in the vicinity of: LL# 1066 and 1067 based on the former use of kerosene to fuel the range lights; the former building located approximately 50 meters north of LL#1067 based on reported potential storage of kerosene in the building; and, the camp that was destroyed by fire based on the presence of a five litre fuel container in the remnants.

3.2 Methodology

3.2.1 Paint Sampling Program

Interior and exterior paint sampling of LL#1067 and of the wooden doors associated with the solar huts and exterior paint sampling of LL#1066, 1068, and 1069 was conducted for metals and mercury analysis. Where possible, a minimum of 10 g of paint was collected from each area (different colored paint) sampled. The PWGSC Paint Sampling Protocol for Lighthouses and Associated Buildings (July 18, 2001) was followed. The lab weighed each paint sample and the areal extent of the samples were approximated in the field. Paint samples were collected from the various different paints associated with the structures. Leachate testing for metals and mercury was conducted on two out of the six paint samples exceeding 5000 mg/kg lead content.

3.2.2 Asbestos Sampling Program

Samples of suspected asbestos containing floor and wall board were collected from the fourth storey of LL#1067. JWEL could not safely collect a sample from the ceiling of the fourth storey of LL#1067; therefore, none were collected. New and old asphalt shingle samples were not collected at the time of the site visit. Asphalt shingle samples should be collected during follow-up work and be analyzed for asbestos content. Should asbestos be confirmed to be present then the shingles could be included in clean up of other site asbestos with minimal cost.

3.2.3 Soil Sampling Program

The following acronyms were used to describe the sample locations: BG-80 = background sample and SS = soil sample.

Fifty-four test holes were excavated by hand on the subject property at the locations shown on Figure No. 4 on September 12 and 13, 2001. The test holes associated with LL#1066, 1068, and 1069 were arranged 90 degrees apart in three concentric rings spaced at 1 m, 10 m, and 20 m from the base of the light tower, with four sample locations per ring for a total of twelve sampling locations per site or thirty-six sample locations in total. Sampling locations on consecutive rings were rotated 45 degrees from those on the previous ring.

The test holes associated with the area of camp destroyed by fire were arranged 90 degrees apart at approximately 1 m distance from the center of the area, with one test hole having been excavated in the center of the area. Five test holes were excavated in this area.

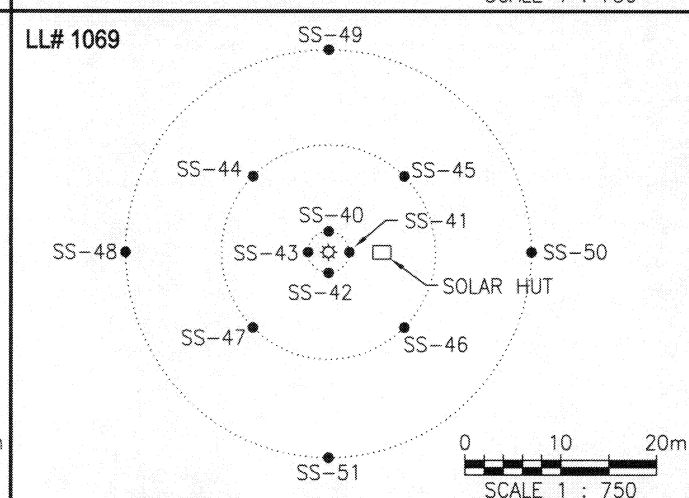
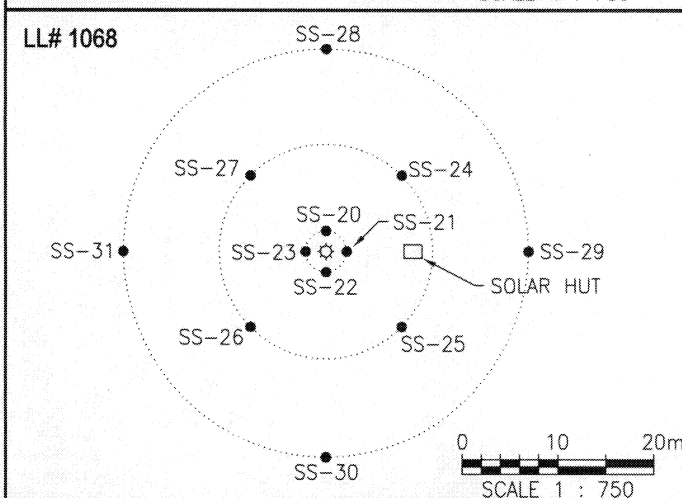
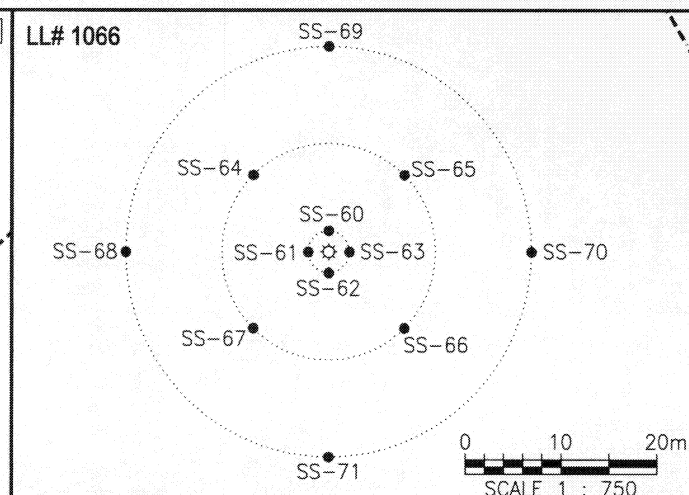
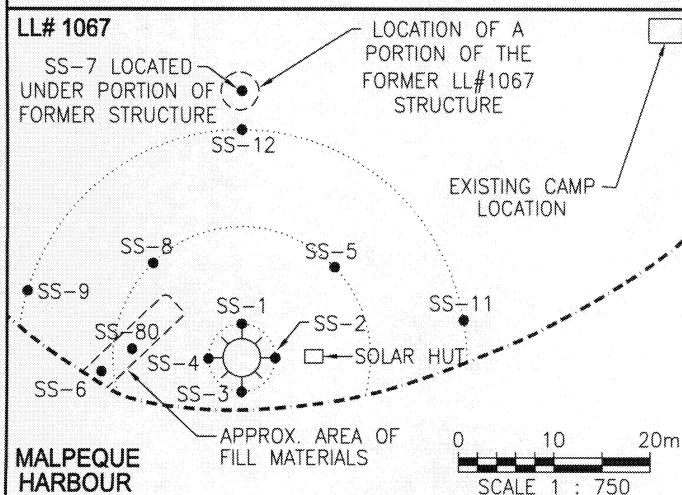
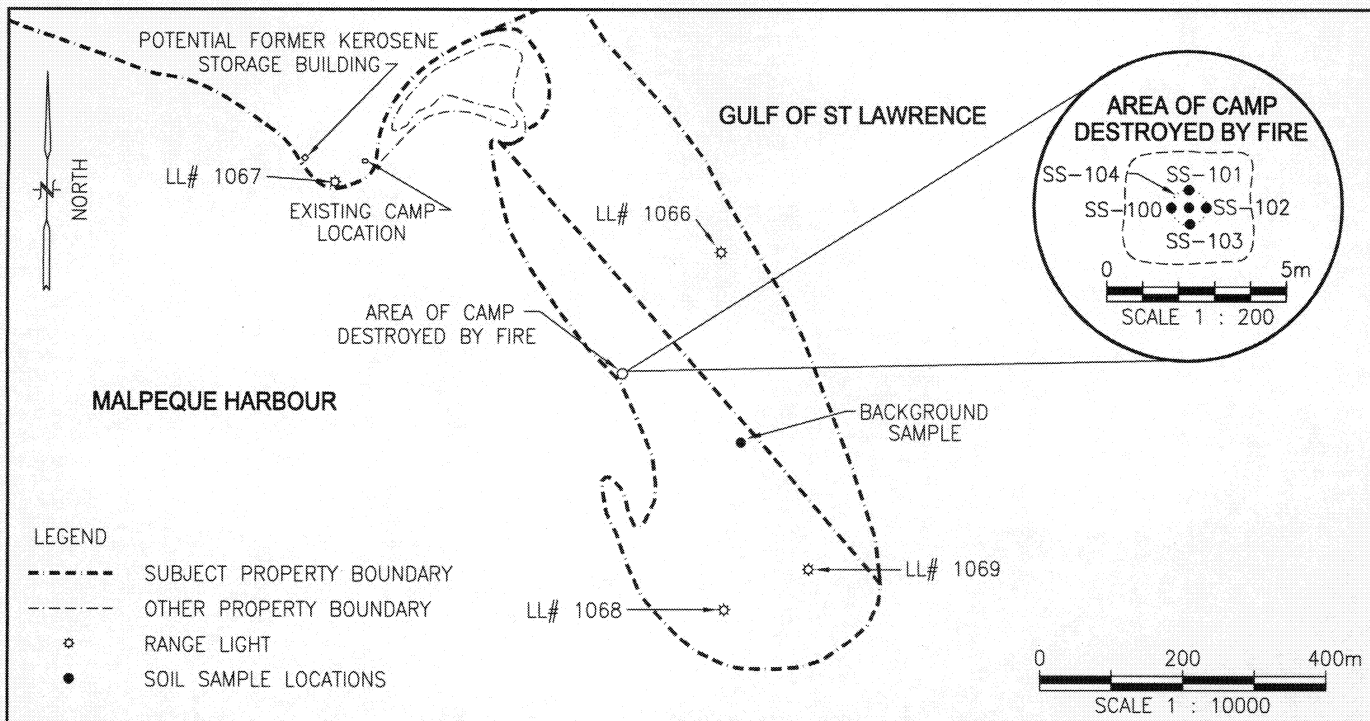
The majority of the test holes associated with LL#1067 were arranged 90 degrees apart in three concentric rings spaced at 1 m, 10 m, and 20 m from the base of the light tower, with four sample locations on the 1 m ring, two sample locations on the 10 m ring, and three sample locations on the 20 m ring. Two sample locations (SS-80 and SS-6) were also excavated in an area of fill material and one sample location (SS-7) was collected from beneath the former roof of the original LL#1067 structure for a total of twelve sampling locations. Sampling locations on consecutive rings were rotated 45 degrees from those on the previous ring.

Three soil samples were collected in each hole at depths of approximately 0-0.15 meters below ground surface (mbgs), 0.15-0.30 mbgs, and 0.30-0.45 mbgs, designated A, B, and C, respectively. Hence, the sample designation SS-1B refers to the sample collected at a depth of 0.15-0.3 m below ground surface.

One background test hole was excavated more than 30 m from the base of the range lights and samples were designated as BG.

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FILE: \13300\07 MALPEQUE HARBOUR\MALPEQUE_HARBOUR_FIG4



<p>SAMPLE LOCATION PLAN</p> <p>MALPEQUE HARBOUR APPROACH RANGE SITES</p> <p>PRINCE COUNTY, PEI, LL#1066, 1067, 1068, 1069,</p> <p>LDU/PN #02175, 81101, 02176, 81102</p> <p>RPIS#MB00064, MB00065, MB00066, MB00067</p> <p>DEPARTMENT OF FISHERIES AND OCEANS</p>	<p>Date:</p> <p>02 01 14</p> <p>Job No.:</p> <p>13300-07</p>	<p>Scale:</p> <p>AS SHOWN</p> <p>Figure No.:</p> <p>4</p>	<p>Jacques Whitford</p> <p>Consulting Engineers Environmental Scientists</p> <p>THIS DRAWING IS THE PROPERTY OF JACQUES WHITFORD AND IT SHALL NOT BE GIVEN OUT, COPIED OR DUPLICATED FOR THE USE OF ANOTHER BUT SHALL BE USED ONLY BY THE RECIPIENT FOR THE PURPOSE TO WHICH IT REFERS.</p>
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Soil conditions encountered in the test holes were logged by JWEL field personnel at the time of sampling and are described in Section 3.3. The recovered soil samples were placed in glass jars in a cooler for transport back to our office.

To minimise the potential for cross-contamination, following hand excavation, a side of the excavation was grazed away and then samples were collected. This was done to collect soil that had not been in contact with the shovel. All "A" depth samples from the 1 m sampling rings, two samples in the area of fill in the vicinity of LL#1067, one sample collected beneath the former LL#1067 roof, one sample from the centre of the area of the camp destroyed by fire, and one background sample were analyzed initially with the remaining samples archived at the laboratory. Following a review of the initial lab data, selected archived samples were submitted for analysis in order to delineate identified contaminants.

In the vicinity of LL#1067, initially only the "A" level samples on the 1 metre ring and SS-6, SS-80, and SS-7 were submitted for soil metal analysis. The initial analytical results indicated lead, zinc and mercury exceedances. Where "A" level exceedances occurred, the "B" and "C" level samples were submitted for analysis of the respective "A" level exceedances. For example, SS-1A had a zinc exceedance, therefore, SS-1B and SS-1C were submitted for zinc analysis. Please note, no exceedances were noted in SS-3A; however, as a precautionary measure, based on proximity to the mercury exceedances on the 1 metre ring and based on the 54% difference from the mean for zinc content, of SS-4A and its blind duplicate, SS-3B and SS-3C were submitted for zinc and mercury analysis.

For delineation purposes, selected "A" level samples were submitted for analysis of the metals noted to be in exceedance during the initial round of analysis, as per DFO's request. For example, SS-5A was submitted for lead, zinc and mercury analysis.

Volatile Organic Compound (VOC) concentration measurements were obtained in the headspace from selected recovered soil samples, at room temperature, using a Gastechtor 1238, calibrated to hexane. This instrument has a detection range from 0 parts per million (ppm) to 10,000 ppm.

3.2.4 Laboratory Analytical Program

The analytical program is summarized in Table 6. All samples were submitted to Philip Analytical Services (Philip) in Bedford, Nova Scotia. Philip is accredited by the Canadian Association of Environmental Analytical Laboratories (CAEAL) for each of the analysis methods utilized and has in-house QA/QC programs to govern sample analysis, including replicates. Laboratory reports are presented in Appendix E.

3.2.5 Quality Assurance/Quality Control (QA/QC) Sampling Program

The QA/QC sampling was conducted on approximately 10% of parameters that were analyzed. QA/QC was addressed by collecting duplicates. The results of this testing were used to evaluate the reliability of the sampling. The numbers and types of QA/QC samples are presented in Table 6. In addition, one background sample was collected outside of the area of the historical site activity as shown on Figure 4.

3.3 Field Observations

Pertinent field observations for soil samples are described in Table H1.

3.3.1 Stratigraphy

Samples were collected from depths of 0 to 0.45 mbgs. The majority of the overburden on the site consisted of light brown to reddish brown sand, excluding the area of LL#1067, which consisted of reddish brown silty sand and areas of fill material. The suspected source of the fill material was the demolition/destruction of the original LL#1067 structure and attached dwelling. Debris observed in the fill material at SS-80 and SS-6 included brick, glass, dishes, and a paint can. Bedrock was not encountered.

3.3.2 Groundwater Conditions

Groundwater was not encountered during the field program. Free product was not identified at any sampling location.

3.3.3 Soil Vapour Conditions

Elevated soil vapour concentrations, typically above 10 ppm, are generally indicative of the presence of volatile petroleum products (i.e. Kerosene and to a lesser extent diesel, or fuel oil). The VOC measurement does not provide an exact quantification of hydrocarbons in the soil, but rather is an indication of the degree of contamination of volatile hydrocarbons relative to other samples. Results, provided in Table H1 in Appendix H, show maximum VOC values of 10 ppm.

Table 6 - Laboratory Program

Matrix	Number of Samples																		
	Metals		Mercury		TPH/BTEX		PAHs		Pesticides/ Herbicides		PCBs		Leachable metals & Hg		ODCA Pkg		Bacteria	Asbestos	
	Actual	QC	Actual	QC	Actual	QC	Actual	QC	Actual	QC	Actual	QC	Actual	QC	Actual	QC	Actual	QC	
Paint	11	1	11	1	-	-	-	-	-	-	-	-	2	0	-	-	-	-	
Swab	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Building Materials	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	0	
Surface Soil	41	5	34	3	4	0	-	-	-	-	-	-	2	0	-	-	-	-	
Sediment	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Soil (from MWs)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Water (from MWs)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Soil (from Test pits)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total # of Samples	52	6	45	4	4	0	0	0	0	0	0	0	4	0	0	0	0	2	0
Notes: - denotes not applicable																			

3.4 Laboratory Analysis Results for Paint

3.4.1 Metals in Paint

Results of the paint sampling are presented in Table 7. Table 8 presents more details on lead results expressed on an area basis.

Lead based paint was identified on the exterior daymark of LL#1066 and on the exterior of LL#1067. The interior fourth storey paint of LL#1067 was suspected to contain lead. However, the substrate was identified in the field to be potentially asbestos. Collecting a paint sample would have disturbed the potential asbestos containing substrate. Since the walls had been damaged, a broken piece of painted wall board was collected and submitted to the lab for paint metal and asbestos analysis. Once the laboratory confirmed the substrate to be asbestos-containing they notified JWEL that they could not collect paint from the sample, to analyze for lead content, due to the health implications of disturbing the asbestos-containing substrate. As indicated in Table 7, five samples contained lead in concentrations greater than the limit of 5,000 ppm (0.5%) and are therefore classified as lead based paint. No samples exceeded the Health Canada Guideline for heavily leaded paint ($>5\text{mg}/\text{cm}^2$).

Paint Metal Samples
<ul style="list-style-type: none"> • 11 submitted • 5 exceeded for Pb • [Pb] 820 to 55,000 mg/kg

All mercury paint concentrations were below the 200 ppm guidance values for interior paint.

3.4.2 Metals in Paint Leachate

As indicated in Section 3.4.1, five paint samples contained lead in concentrations greater than the limit of 5,000 ppm. Out of these five samples, the two paint samples having the greatest lead concentration were analysed for leachate toxicity in accordance with CGSB 164-GP-IMP. Leachate results presented in Table 9 show lead leachate levels did not exceed the TDGA criteria.

Paint Leachate Samples
<ul style="list-style-type: none"> • 2 submitted • 0 exceeded for Pb • [Pb] 140-4600 • g/L

Note that paint samples with lead concentrations below 5000 ppm may also exceed TDGA criteria.

Table 7 - Metal Concentrations in Paint

Parameter	Units	EQL	Guidelines	Sample Identification							
				H057718	H057717	H057719	H057720	H057721	H057722	H057723	H057724
				PB1 1068 Daymark	PB2 1068 Solar Hut Door	PB3 1069 Solar Hut Door	PB4 1069 Daymark	PB5 1066 Daymark	PB6 1066 Battery Box	PB8 1067 Trim	PB9 1067 Range Light
				Ext. Wood White	Ext. Wood White	Ext. Wood White	Ext. Wood White	Ext. Wood White	Ext. Wood Red	Ext. Metal Red	Ext. Wood White
Aluminum	mg/kg	10		4600	4700	6300	4100	6500	630	2400	7300
Antimony	mg/kg	2		nd	nd	nd	nd	nd	71	11	nd
Arsenic	mg/kg	2		nd	nd	nd	nd	nd	2	nd	nd
Barium	mg/kg	5		120	7	44	54	13	30	1500	31
Beryllium	mg/kg	5		nd	nd	nd	nd	nd	nd	nd	nd
Boron	mg/kg	5		16	5	27	5	nd	nd	34	14
Cadmium	mg/kg	0.3		3.3	0.6	0.4	1.7	0.4	0.4	0.3	0.3
Chromium	mg/kg	2		3	2	nd	4	8	560	430	2
Cobalt	mg/kg	1		150	260	220	240	93	79	280	60
Copper	mg/kg	2		5	4	6	4	4	12	2000	23
Iron	mg/kg	20		580	250	310	560	460	2200	980	300
Lead	mg/kg	0.5	5000(1)	1900	1300	820	1300	28000	3600	16000	52000
Manganese	mg/kg	2		92	100	110	42	16	20	98	93
Molybdenum	mg/kg	2		nd	nd	nd	nd	nd	120	34	nd
Nickel	mg/kg	2		nd	nd	nd	nd	nd	nd	9	nd
Selenium	mg/kg	2		nd	nd	nd	nd	nd	nd	nd	nd
Silver	mg/kg	0.5		nd	nd	nd	nd	nd	nd	nd	nd
Strontium	mg/kg	5		25	11	33	10	26	72	30	24
Thallium	mg/kg	0.1		nd	nd	0.1	nd	0.2	nd	0.3	1.2
Uranium	mg/kg	0.1		0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1
Vanadium	mg/kg	2		3	nd	2	3	4	2	6	2
Zinc	mg/kg	2		5300	310	190	1500	730	860	12000	53000
Mercury	mg/kg	0.01	200 (2)	41	5.4	42	16	9.7	0.18	5.7	18

Notes:

(1) Hazardous Products (Liquid Coating Materials) Regulations
Item 31 of Part II of Schedule I, Health Canada 1976

(2) National Paint and Coatings Association guidance
for mercury in interior paint

EQL - estimated quantitation limit

Int = Interior, Ext - Exterior

nd - not detected (ie. less than the EQL)

Bold - sample concentration exceeds guideline

Table 7 - Metal Concentrations in Paint

Parameter	Units	EQL	Guidelines	Sample Identification				
				H057727	H057725	H057726	H057728	
				PB 12 Blind Dup of PB9	PB10 1067 Saircase	PB11 1067 Skeleton Steel	PB13 Former 1067 Catwalk Ext.	
				Ext. Wood White	Ext. Metal Red	Ext. Metal Orange/Red	Wood White	
Aluminum	mg/kg	10		6200	540	110	6400	
Antimony	mg/kg	2		nd	nd	nd	nd	
Arsenic	mg/kg	2		nd	22	17	2	
Barium	mg/kg	5		31	1300	nd	40	
Beryllium	mg/kg	5		nd	nd	nd	nd	
Boron	mg/kg	5		14	47	nd	14	
Cadmium	mg/kg	0.3		0.7	2	13	1.3	
Chromium	mg/kg	2		4	11000	1900	35	
Cobalt	mg/kg	1		82	280	38	100	
Copper	mg/kg	2		38	360	170	11	
Iron	mg/kg	20		1500	150000	360000	930	
Lead	mg/kg	0.5	5000(1)	48000	55000	8000	1100	
Manganese	mg/kg	2		92	640	1400	98	
Molybdenum	mg/kg	2		nd	7	7	nd	
Nickel	mg/kg	2		nd	100	100	7	
Selenium	mg/kg	2		nd	nd	nd	nd	
Silver	mg/kg	0.5		nd	0.5	nd	nd	
Strontium	mg/kg	5		25	38	8	32	
Thallium	mg/kg	0.1		1	1	0.1	0.1	
Uranium	mg/kg	0.1		0.1	0.1	nd	0.2	
Vanadium	mg/kg	2		2	13	2	3	
Zinc	mg/kg	2		46000	17000	2100	400	
Mercury	mg/kg	0.01	200 (2)	19	0.15	nd	26	

Notes:

(1) Hazardous Products (Liquid Coating Materials) Regulations

Item 31 of Part II of Schedule I, Health Canada 1976

(2) National Paint and Coatings Association guidance

for mercury in interior paint

EQL - estimated quantitation limit

Int = Interior, Ext - Exterior

nd - not detected (ie. less than the EQL)

Bold - sample concentration exceeds guideline

Table 8 - Lead Paint Concentrations

Lab ID	Field ID	Interior or Exterior	Substrate	Colour	Lead mg/kg	Sample Area (cm ²)	Total Sample Weight (g)	Lead ¹ (mg/cm ²)	Guidelines
H057718	PB1 1068 Daymark	Ext.	Wood	White	1900	103	2.44	0.05	Health Canada Guidelines >1 mg/cm ² = requires precautions for children and pregnant women >5 mg/cm ² heavily leaded
H057717	PB2 1068 Solar Hut Door	Ext.	Wood	White	1300	103	1.49	0.02	
H057719	PB3 1069 Solar Hut Door	Ext.	Wood	White	820	58	1.17	0.02	
H057720	PB4 1069 Daymark	Ext.	Wood	White	1300	161	3.10	0.02	
H057721	PB5 1066 Daymark	Ext.	Wood	White	28000	316	3.33	0.29	
H057722	PB6 1066 Battery Box	Ext.	Wood	Red	3600	413	7.20	0.06	
H057723	PB8 1067 Trim	Ext.	Metal	Red	16000	316	4.63	0.23	
H057724	PB9 1067 Range Light	Ext.	Wood	White	52000	232	6.88	1.54	
H057727	PB 12 Blind Dup of PB9	Ext.	Wood	White	48000	413	11.20	1.30	
H057725	PB10 1067 Saircase	Ext.	Metal	Red	55000	413	11.60	1.545	
H057726	PB11 1067 Skeleton Steel	Ext.	Metal	Orange/Red	8000	1452	118.00	0.65	Hazardous Products Regulation
H057728	PB13 Former 1067 Catwalk	Ext.	Wood	White	1100	1703	2.36	0.00	
Notes: Sample calculation - (mg/kg Lead x Total Sample Weight(g) / 1000)/Sample Area(cm ²) Due to paint adherence to substrate for PB 11 and PB13, the mass includes the paint as well as the substrate. Bold - denotes above Health Canada Guidelines of 5mg/cm ² and/or the Hazardous Products Regulations (>5000 mg/kg)									

Table 9 - Metal Concentrations in Paint Leachate

Parameter	Units	EQL	TDGA Leachate Criteria	Sample Identification	
				H062037	H062038
				PB 9	PB 10
				Ext. LL#1067	Ext. LL#1067
				Wood	Metal
				White	Red
Aluminum	ug/L	100		140	nd
Antimony	ug/L	20		nd	nd
Arsenic	ug/L	20	5000	nd	nd
Barium	ug/L	50	100000	nd	310
Beryllium	ug/L	50		nd	nd
Boron	ug/L	50	500000	nd	78
Cadmium	ug/L	3	500	nd	nd
Chromium	ug/L	20	5000	nd	420
Cobalt	ug/L	10		nd	48
Copper	ug/L	20		340	nd
Iron	ug/L	200		nd	nd
Lead	ug/L	5	5000	4600	140
Manganese	ug/L	20		32	250
Molybdenum	ug/L	20		nd	nd
Nickel	ug/L	20		nd	nd
Selenium	ug/L	20	1000	nd	nd
Silver	ug/L	5		nd	nd
Strontium	ug/L	50		nd	nd
Thallium	ug/L	1		nd	nd
Tin	ug/L	20		nd	nd
Uranium	ug/L	1	2000	nd	nd
Vanadium	ug/L	20		nd	nd
Zinc	ug/L	20		18000	4700
Notes: EQL - estimated quantitation limit Ext - exterior LL# = List of Light Number nd - not detected (ie. less than the EQL) Bold - sample concentration exceeds TDGA Criteria Leachate analysis performed in accordance with CGSB-164-GP-IMP					

3.5 Laboratory Analysis Results for Potential Asbestos Containing Material

Results of the potential asbestos-containing material sampling are presented in Table 10. The floor and wall board samples collected from the interior fourth storey of LL#1067 were found to contain fibrous asbestos (chrysotile). Note that the ceiling board observed but not sampled in the interior fourth storey of LL#1067 was suspected to be the same material as the wall board and is therefore, assumed to be asbestos-containing.

Asbestos Samples
<ul style="list-style-type: none"> • 2 submitted • 2 exceeded for Chrysotile • [Chrysotile] 20-40%

3.6 Laboratory Analysis Results for Soil

3.6.1 Metals in Soil

Laboratory analytical results for metals in soil are given in Table 11. Concentrations of soil samples tested on the subject property were below the CCME commercial remediation criteria for metal parameters, except as follows (see Figure 5):

- SS-1A, B, and C – zinc;
- SS-2A and B – mercury and zinc;
- SS-2C – zinc;
- SS-4A, 4B – lead and zinc;
- SS-6A – lead.
- SS-7A – lead and zinc, and
- SS-80A – lead.

Soil Metal Samples
<ul style="list-style-type: none"> • 41 submitted • 5 exceeded for Pb • 9 exceeded for Zn • 2 exceeded for Hg • [Pb] 0.6-900 mg/kg • [Zn] 9-11,000 mg/kg • [Hg] <0.01-120 mg/kg

3.6.2 Metals in Soil Leachate

Based on the metals in soil results, the sample having the largest exceedance of the 5,000 ppm for lead and the sample having the largest mercury content were analysed for leachate. Laboratory analytical results for soil lead and mercury leachate are provided in Table 12. Leachate concentrations from the two soil samples were less than the limit defined in the Transportation of Dangerous Goods Act (5.0 mg/L for lead and 100 ug/L for mercury) and are therefore not classified as leachable toxic wastes.

Soil Leachate Samples
<ul style="list-style-type: none"> • 1 Pb and 1 Hg submitted • 0 exceeded for Pb • 0 exceeded for Hg

Table 10 - Asbestos in Building Materials

Parameter	Units	EQL	Provincial Guideline	ASB 3 LL#1067 wall & ceiling board	ASB 2 LL#1067 floor board
Asbestos	% (w)	1	1	Present	Present
Chrysotile	% (w)	1	1	20-40	20-40
Amosite	% (w)	1	1	nd	nd
Crocidolite	% (w)	1	1	nd	nd
Cellulose	% (w)	1	nc	nd	nd
Glass Fibres	% (w)	1	nc	nd	nd
Hair	% (w)	1	nc	nd	nd
Other	% (w)	1	nc	nd	nd
Mineral Wool	% (w)	1	nc	nd	nd
Notes:					
EQL - estimated quantitation limit					
nd - less than the EQL; nc - no criteria developed; LL# = List of Light Number					
Bold - sample concentration exceeds Commercial criteria					

Table 11 - Metal Concentrations in Soil

Parameter	Units	EQL	CCME Guidelines		Sample Identification						
			R/P	C	SS-1A	SS-1B	SS-1C	SS-2A	SS-2B	SS-2C	SS-3A
			sample depth (mbgs)		0-0.15	0.15-0.3	0.3-0.45	0-0.15	0.15-0.3	0.3-0.45	0-0.15
Aluminum	mg/kg	10	nc	nc	10000	-	-	7000	-	-	5700
Antimony	mg/kg	2	20	40	nd	-	-	nd	-	-	nd
Arsenic	mg/kg	2	12	12	2	-	-	2	-	-	nd
Barium	mg/kg	5	500	2000	22	-	-	31	-	-	48
Beryllium	mg/kg	5	4	8	nd	-	-	nd	-	-	nd
Boron	mg/kg	5	nc	nc	nd	-	-	nd	-	-	nd
Cadmium	mg/kg	0.3	10	22	0.5	-	-	2.1	-	-	nd
Chromium	mg/kg	2	64	87	11	-	-	11	-	-	5
Cobalt	mg/kg	1	50	300	5	-	-	4	-	-	3
Copper	mg/kg	2	63	91	8	-	-	10	-	-	3
Iron	mg/kg	20	nc	nc	9000	-	-	7700	-	-	7100
Lead	mg/kg	0.5	140	260	100	-	-	97	-	-	130
Manganese	mg/kg	2	nc	nc	680	-	-	850	-	-	1600
Molybdenum	mg/kg	2	10	40	nd	-	-	nd	-	-	nd
Nickel	mg/kg	2	50	50	12	-	-	10	-	-	5
Selenium	mg/kg	2	3	10	nd	-	-	nd	-	-	nd
Silver	mg/kg	0.5	20	40	nd	-	-	nd	-	-	nd
Strontium	mg/kg	5	nc	nc	nd	-	-	6	-	-	nd
Thallium	mg/kg	0.1	1	1	nd	-	-	0.1	-	-	0.1
Uranium	mg/kg	0.1	nc	nc	0.3	-	-	0.4	-	-	0.2
Vanadium	mg/kg	2	130	130	14	-	-	15	-	-	12
Zinc	mg/kg	2	200	360	<u>3500</u>	<u>1300</u>	<u>5000</u>	<u>11000</u>	<u>5500</u>	<u>2800</u>	81
Mercury	mg/kg	0.01	6.6	24	5.6	-	-	<u>120</u>	<u>35</u>	<u>12</u>	0.12

Notes:

CCME Criteria - Canadian Council of Ministers of the Environment

Environmental Quality Criteria (1991- 1999)

R/P - Residential/Parkland; C-Commercial

EQL - estimated quantitation limit

nd - less than the EQL; nc - no criteria developed

Bold - sample concentration exceeds Commercial criteria

Table 11 - Metal Concentrations in Soil

Parameter	Units	EQL	CCME Guidelines		Sample Identification						
			R/P	C	SS-3B	SS-3C	SS-4A	DUP 30A(blind of SS4A)	SS-4A DUP	SS-4B	DUP 31 (blind of SS4B)
			sample depth (mbgs)		0.15-0.3	0.3-0.45	0-0.15	0-0.15	0-0.15	0.15-0.3	0.15-0.3
Aluminum	mg/kg	10	nc	nc	-	-	4900	6000	5600	-	-
Antimony	mg/kg	2	20	40	-	-	nd	nd	nd	-	-
Arsenic	mg/kg	2	12	12	-	-	nd	nd	nd	-	-
Barium	mg/kg	5	500	2000	-	-	75	65	67	-	-
Beryllium	mg/kg	5	4	8	-	-	nd	nd	nd	-	-
Boron	mg/kg	5	nc	nc	-	-	nd	nd	nd	-	-
Cadmium	mg/kg	0.3	10	22	-	-	0.3	0.3	0.4	-	-
Chromium	mg/kg	2	64	87	-	-	5	7	6	-	-
Cobalt	mg/kg	1	50	300	-	-	3	3	3	-	-
Copper	mg/kg	2	63	91	-	-	5	4	5	-	-
Iron	mg/kg	20	nc	nc	-	-	4900	5700	5600	-	-
Lead	mg/kg	0.5	140	260	-	-	870	730	900	230	880
Manganese	mg/kg	2	nc	nc	-	-	640	580	720	-	-
Molybdenum	mg/kg	2	10	40	-	-	nd	nd	nd	-	-
Nickel	mg/kg	2	50	50	-	-	5	7	6	-	-
Selenium	mg/kg	2	3	10	-	-	nd	nd	nd	-	-
Silver	mg/kg	0.5	20	40	-	-	nd	nd	nd	-	-
Strontium	mg/kg	5	nc	nc	-	-	nd	nd	nd	-	-
Thallium	mg/kg	0.1	1	1	-	-	nd	0.1	0.1	-	-
Uranium	mg/kg	0.1	nc	nc	-	-	0.2	0.2	0.2	-	-
Vanadium	mg/kg	2	130	130	-	-	8	9	9	-	-
Zinc	mg/kg	2	200	360	24	28	740	2500	880	480	900
Mercury	mg/kg	0.01	6.6	24	0.04	0.04	0.28	0.73	0.33	-	-

Notes:

CCME Criteria - Canadian Council of Ministers of the Environment

Environmental Quality Criteria (1991- 1999)

R/P - Residential/Parkland; C-Commercial

EQL - estimated quantitation limit

nd - less than the EQL; nc - no criteria developed

Bold - sample concentration exceeds Commercial criteria

Table 11 - Metal Concentrations in Soil

Parameter	Units	EQL	CCME Guidelines		Sample Identification							
			R/P	C	SS-4C	SS-5A	SS-6A	SS-6B	SS-6C	SS-6C DUP	SS-7	
			sample depth (mbgs)									
Aluminum	mg/kg	10	nc	nc	-	-	3000	-	-	-	-	9400
Antimony	mg/kg	2	20	40	-	-	nd	-	-	-	-	nd
Arsenic	mg/kg	2	12	12	-	-	5	-	-	-	-	2
Barium	mg/kg	5	500	2000	-	-	47	-	-	-	-	43
Beryllium	mg/kg	5	4	8	-	-	nd	-	-	-	-	nd
Boron	mg/kg	5	nc	nc	-	-	nd	-	-	-	-	nd
Cadmium	mg/kg	0.3	10	22	-	-	0.4	-	-	-	-	0.6
Chromium	mg/kg	2	64	87	-	-	4	-	-	-	-	8
Cobalt	mg/kg	1	50	300	-	-	1	-	-	-	-	4
Copper	mg/kg	2	63	91	-	-	5	-	-	-	-	5
Iron	mg/kg	20	nc	nc	-	-	3400	-	-	-	-	8700
Lead	mg/kg	0.5	140	260	37	15	290	13	5.3	5.4	450	<u>1000</u>
Manganese	mg/kg	2	nc	nc	-	-	230	-	-	-	-	nd
Molybdenum	mg/kg	2	10	40	-	-	nd	-	-	-	-	nd
Nickel	mg/kg	2	50	50	-	-	3	-	-	-	-	8
Selenium	mg/kg	2	3	10	-	-	nd	-	-	-	-	nd
Silver	mg/kg	0.5	20	40	-	-	nd	-	-	-	-	nd
Strontium	mg/kg	5	nc	nc	-	-	29	-	-	-	-	nd
Thallium	mg/kg	0.1	1	1	-	-	0.1	-	-	-	-	0.1
Uranium	mg/kg	0.1	nc	nc	-	-	0.3	-	-	-	-	0.3
Vanadium	mg/kg	2	130	130	-	-	9	-	-	-	-	14
Zinc	mg/kg	2	200	360	100	24	160	-	-	-	-	650
Mercury	mg/kg	0.01	6.6	24	-	0.07	0.11	-	-	-	-	0.06

Notes:

CCME Criteria - Canadian Council of Ministers of the Environment

Environmental Quality Criteria (1991- 1999)

R/P - Residential/Parkland; C-Commercial

EQL - estimated quantitation limit

nd - less than the EQL; nc - no criteria developed

Bold - sample concentration exceeds Commercial criteria

Table 11 - Metal Concentrations in Soil

Parameter	Units	EQL	CCME Guidelines		Sample Identification							
			R/P	C	SS-8B	SS-9A	SS-11A	DUP 32 (blind of SS-11A)	SS-12A	SS-12A DUP	SS-20A	
			sample depth (mbgs)									
Aluminum	mg/kg	10	nc	nc	-	-	-	-	-	-	-	1500
Antimony	mg/kg	2	20	40	-	-	-	-	-	-	-	nd
Arsenic	mg/kg	2	12	12	-	-	-	-	-	-	-	nd
Barium	mg/kg	5	500	2000	-	-	-	-	-	-	-	nd
Beryllium	mg/kg	5	4	8	-	-	-	-	-	-	-	nd
Boron	mg/kg	5	nc	nc	-	-	-	-	-	-	-	nd
Cadmium	mg/kg	0.3	10	22	-	-	-	-	-	-	-	nd
Chromium	mg/kg	2	64	87	-	-	-	-	-	-	-	3
Cobalt	mg/kg	1	50	300	-	-	-	-	-	-	-	1
Copper	mg/kg	2	63	91	-	-	-	-	-	-	-	nd
Iron	mg/kg	20	nc	nc	-	-	-	-	-	-	-	2700
Lead	mg/kg	0.5	140	260	19	70	16	17	12	11	0.9	
Manganese	mg/kg	2	nc	nc	-	-	-	-	-	-	36	
Molybdenum	mg/kg	2	10	40	-	-	-	-	-	-	nd	
Nickel	mg/kg	2	50	50	-	-	-	-	-	-	3	
Selenium	mg/kg	2	3	10	-	-	-	-	-	-	nd	
Silver	mg/kg	0.5	20	40	-	-	-	-	-	-	nd	
Strontium	mg/kg	5	nc	nc	-	-	-	-	-	-	nd	
Thallium	mg/kg	0.1	1	1	-	-	-	-	-	-	nd	
Uranium	mg/kg	0.1	nc	nc	-	-	-	-	-	-	0.1	
Vanadium	mg/kg	2	130	130	-	-	-	-	-	-	3	
Zinc	mg/kg	2	200	360	19	36	19	21	30	30	10	
Mercury	mg/kg	0.01	6.6	24	0.02	0.02	0.04	-	0.06	0.06	nd	

Notes:

CCME Criteria - Canadian Council of Ministers of the Environment

Environmental Quality Criteria (1991- 1999)

R/P - Residential/Parkland; C-Commercial

EQL - estimated quantitation limit

nd - less than the EQL; nc - no criteria developed

Bold - sample concentration exceeds Commercial criteria

Table 11 - Metal Concentrations in Soil

Parameter	Units	EQL	CCME Guidelines		Sample Identification							
			R/P	C	SS-21A	SS-22A	SS-23A	SS-40A	SS-41A	SS-42A	SS-42A DUP	SS-43A
			sample depth (mbgs)									
Aluminum	mg/kg	10	nc	nc	1200	1200	1300	1300	1300	1000	1200	1400
Antimony	mg/kg	2	20	40	nd	nd	nd	nd	nd	nd	nd	nd
Arsenic	mg/kg	2	12	12	nd	nd	nd	nd	nd	nd	nd	nd
Barium	mg/kg	5	500	2000	nd	nd	nd	nd	nd	nd	nd	nd
Beryllium	mg/kg	5	4	8	nd	nd	nd	nd	nd	nd	nd	nd
Boron	mg/kg	5	nc	nc	nd	nd	nd	nd	nd	nd	nd	nd
Cadmium	mg/kg	0.3	10	22	nd	nd	nd	nd	nd	nd	nd	nd
Chromium	mg/kg	2	64	87	2	2	3	3	2	2	2	3
Cobalt	mg/kg	1	50	300	1	1	1	1	1	1	1	1
Copper	mg/kg	2	63	91	nd	nd	nd	nd	nd	nd	nd	nd
Iron	mg/kg	20	nc	nc	2300	2300	2500	2500	2300	1900	2200	2600
Lead	mg/kg	0.5	140	260	0.9	0.7	0.7	1.2	0.9	0.6	0.6	1.1
Manganese	mg/kg	2	nc	nc	33	30	34	34	32	27	32	37
Molybdenum	mg/kg	2	10	40	nd	nd	nd	nd	nd	nd	nd	nd
Nickel	mg/kg	2	50	50	3	2	3	3	3	2	2	3
Selenium	mg/kg	2	3	10	nd	nd	nd	nd	nd	nd	nd	nd
Silver	mg/kg	0.5	20	40	nd	nd	nd	nd	nd	nd	nd	nd
Strontium	mg/kg	5	nc	nc	nd	nd	nd	nd	nd	nd	nd	nd
Thallium	mg/kg	0.1	1	1	nd	nd	nd	nd	nd	nd	nd	nd
Uranium	mg/kg	0.1	nc	nc	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Vanadium	mg/kg	2	130	130	4	6	3	3	3	4	2	3
Zinc	mg/kg	2	200	360	10	9	11	13	12	10	11	15
Mercury	mg/kg	0.01	6.6	24	nd	nd	nd	nd	nd	nd	nd	nd

Notes:

CCME Criteria - Canadian Council of Ministers of the Environment

Environmental Quality Criteria (1991- 1999)

R/P - Residential/Parkland; C-Commercial

EQL - estimated quantitation limit

nd - less than the EQL; nc - no criteria developed

Bold - sample concentration exceeds Commercial criteria

Table 11 - Metal Concentrations in Soil

Parameter	Units	EQL	CCME Guidelines		Sample Identification									
			R/P	C	SS-60A	DUP 20A (blind of SS 60A)	SS-61A	SS-62A	SS-63A	SS-80A	SS-80B	SS-80C	SS-100A	
			sample depth (mbgs)											
Aluminum	mg/kg	10	nc	nc	1100	1400	1200	1400	1500	0-0.15	0-0.15	0.15-0.3	0.3-0.45	0-0.15
Antimony	mg/kg	2	20	40	nd	nd	nd	nd	nd	2500	-	-	-	1000
Arsenic	mg/kg	2	12	12	nd	nd	nd	nd	nd	nd	-	-	-	nd
Barium	mg/kg	5	500	2000	nd	nd	nd	nd	nd	130	-	-	-	nd
Beryllium	mg/kg	5	4	8	nd	nd	nd	nd	nd	nd	-	-	-	nd
Boron	mg/kg	5	nc	nc	nd	nd	nd	nd	nd	nd	-	-	-	nd
Cadmium	mg/kg	0.3	10	22	nd	nd	nd	nd	nd	0.3	-	-	-	nd
Chromium	mg/kg	2	64	87	2	3	2	3	3	5	-	-	-	2
Cobalt	mg/kg	1	50	300	1	1	1	1	1	2	-	-	-	1
Copper	mg/kg	2	63	91	nd	nd	nd	nd	nd	3	-	-	-	nd
Iron	mg/kg	20	nc	nc	2100	2600	2200	2500	2700	2900	-	-	-	2000
Lead	mg/kg	0.5	140	260	0.9	1.3	0.9	0.9	0.9	670	0.7	0.8	0.8	4.5
Manganese	mg/kg	2	nc	nc	30	37	31	36	39	240	-	-	-	29
Molybdenum	mg/kg	2	10	40	nd	nd	nd	nd	nd	nd	-	-	-	nd
Nickel	mg/kg	2	50	50	2	3	3	3	3	3	-	-	-	2
Selenium	mg/kg	2	3	10	nd	nd	nd	nd	nd	nd	-	-	-	nd
Silver	mg/kg	0.5	20	40	nd	nd	nd	nd	nd	nd	-	-	-	nd
Strontium	mg/kg	5	nc	nc	nd	nd	nd	nd	nd	39	-	-	-	nd
Thallium	mg/kg	0.1	1	1	nd	nd	nd	nd	nd	nd	-	-	-	nd
Uranium	mg/kg	0.1	nc	nc	0.2	0.1	0.2	0.1	0.1	0.1	-	-	-	0.1
Vanadium	mg/kg	2	130	130	4	3	4	3	4	5	-	-	-	2
Zinc	mg/kg	2	200	360	16	16	27	28	16	270	-	-	-	11
Mercury	mg/kg	0.01	6.6	24	nd	nd	nd	nd	nd	0.03	-	-	-	nd

Notes:

CCME Criteria - Canadian Council of Ministers of the Environment

Environmental Quality Criteria (1991- 1999)

R/P - Residential/Parkland; C-Commercial

EQL - estimated quantitation limit

nd - less than the EQL; nc - no criteria developed

Bold - sample concentration exceeds Commercial criteria

Table 11 - Metal Concentrations in Soil

Parameter	Units	EQL	CCME Guidelines		Sample Identification					
			R/P	C	SS-101A	SS-102A	SS-103A	SS-104A	SS-104A DUP	BG80-A
sample depth (mbgs)										
Aluminum	mg/kg	10	nc	nc	1100	1100	1100	1100	1200	1400
Antimony	mg/kg	2	20	40	nd	nd	nd	nd	nd	nd
Arsenic	mg/kg	2	12	12	nd	nd	nd	nd	nd	nd
Barium	mg/kg	5	500	2000	nd	nd	nd	nd	nd	nd
Beryllium	mg/kg	5	4	8	nd	nd	nd	nd	nd	nd
Boron	mg/kg	5	nc	nc	nd	nd	nd	nd	nd	nd
Cadmium	mg/kg	0.3	10	22	nd	nd	nd	nd	nd	nd
Chromium	mg/kg	2	64	87	2	2	2	2	2	2
Cobalt	mg/kg	1	50	300	1	1	1	1	1	1
Copper	mg/kg	2	63	91	nd	nd	nd	nd	nd	nd
Iron	mg/kg	20	nc	nc	2100	2000	2100	2100	2300	2500
Lead	mg/kg	0.5	140	260	4.3	2.7	2.9	2.9	3.1	0.9
Manganese	mg/kg	2	nc	nc	33	28	31	27	28	36
Molybdenum	mg/kg	2	10	40	nd	nd	nd	nd	nd	nd
Nickel	mg/kg	2	50	50	2	2	2	2	2	2
Selenium	mg/kg	2	3	10	nd	nd	nd	nd	nd	nd
Silver	mg/kg	0.5	20	40	nd	nd	nd	nd	nd	nd
Strontium	mg/kg	5	nc	nc	nd	nd	nd	nd	nd	nd
Thallium	mg/kg	0.1	1	1	nd	nd	nd	nd	nd	nd
Uranium	mg/kg	0.1	nc	nc	0.1	0.1	0.1	0.1	0.1	0.1
Vanadium	mg/kg	2	130	130	2	2	2	3	3	3
Zinc	mg/kg	2	200	360	13	10	12	13	16	11
Mercury	mg/kg	0.01	6.6	24	nd	nd	0.02	nd	nd	0.05

Notes:

CCME Criteria - Canadian Council of Ministers of the Environment

Environmental Quality Criteria (1991- 1999)

R/P - Residential/Parkland; C-Commercial

EQL - estimated quantitation limit

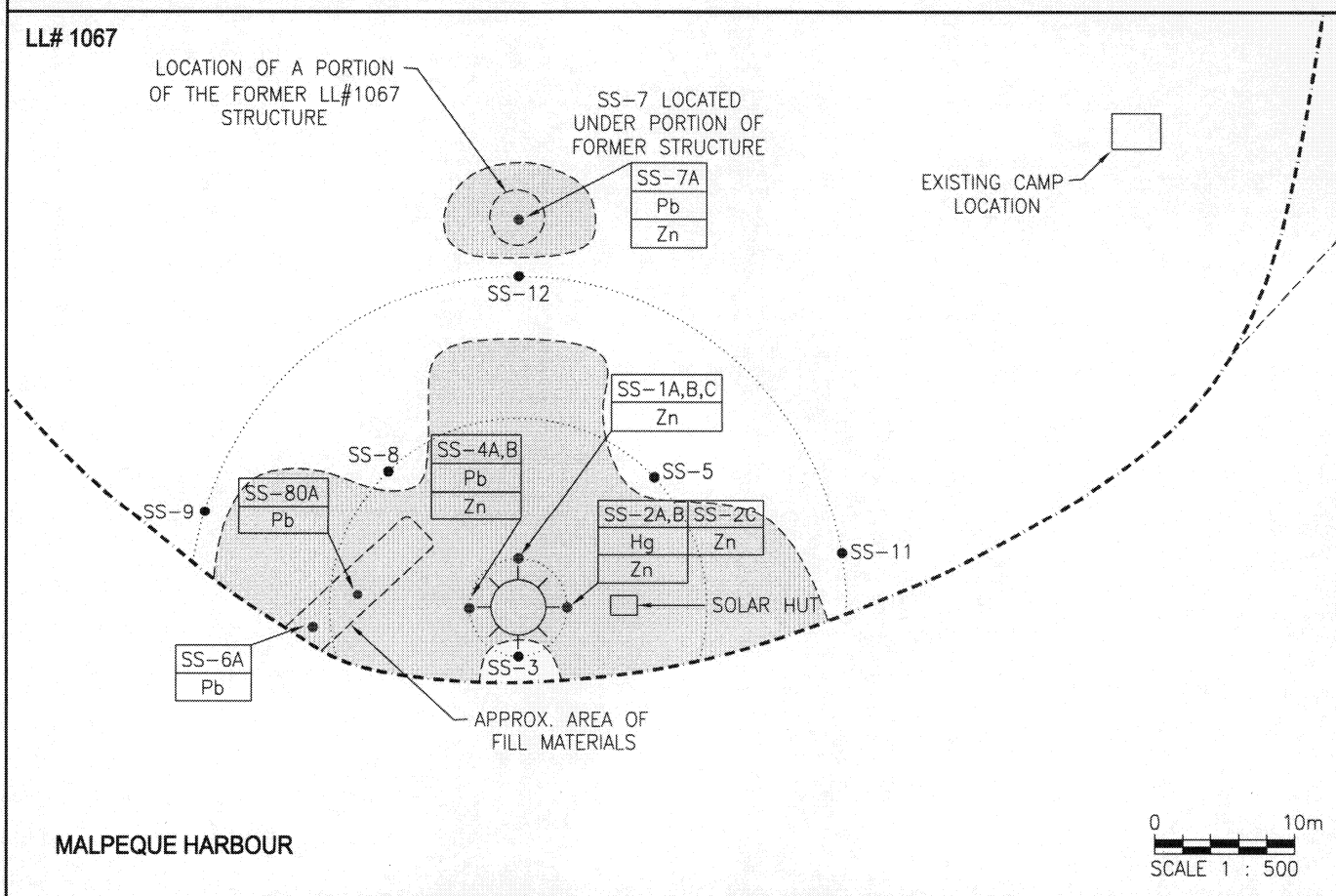
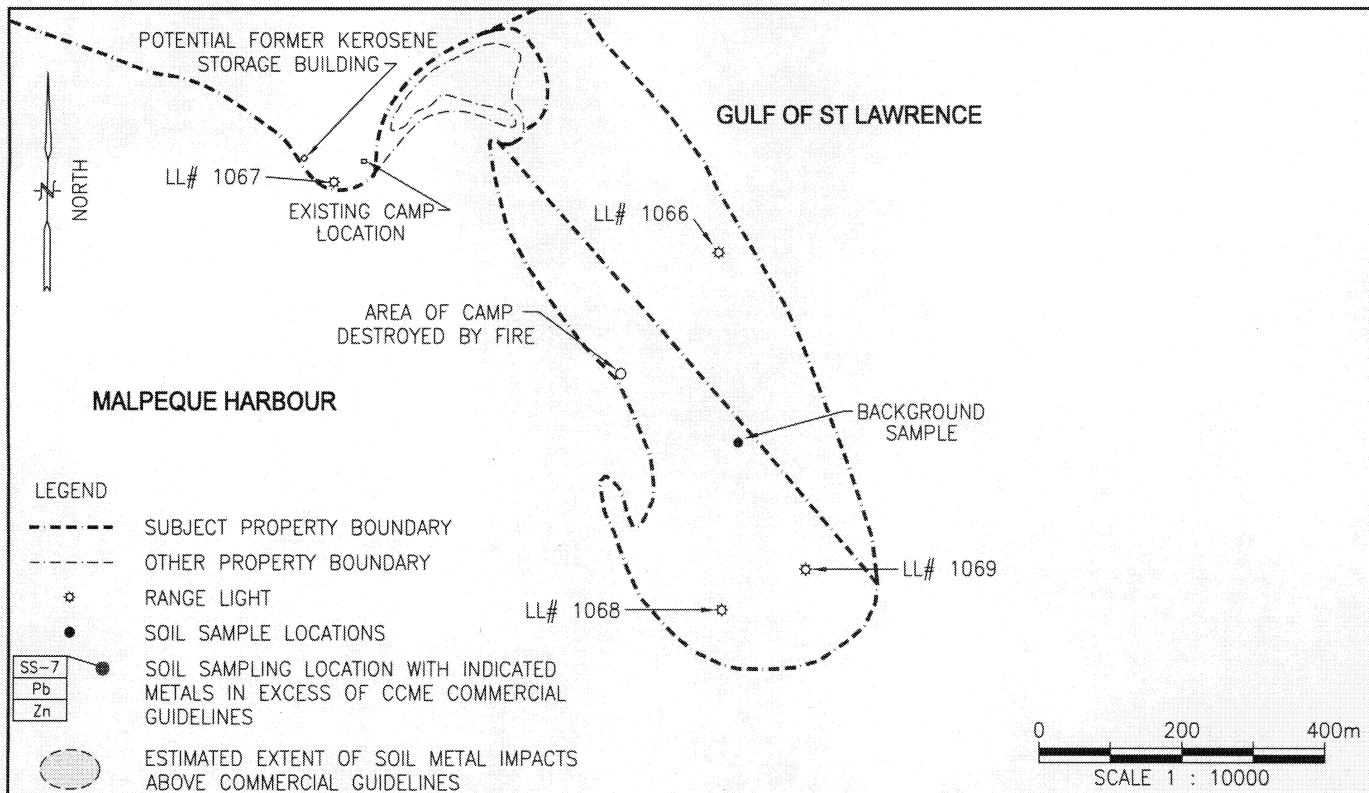
nd - less than the EQL; nc - no criteria developed

Bold - sample concentration exceeds Commercial criteria

Table 12 - Metal Concentrations in Soil Leachate

Parameter	Units	EQL	TDGA Leachate Criteria	Sample Identification	
				SS2A (0-0.15 mbg)	SS4A (0-0.15 mbg)
Lead	ug/L	5	5000	-	3710
Mercury	ug/L	5	100	45	-
Notes: EQL - estimated quantitation limit nd - not detected (ie. less than the EQL) mbg = metres below grade Leachate analysis performed in accordance with CGSB-164-GP-IMP Bold - Sample concentrations exceeds TDGA leachate criteria					

FILE: \13300\07 MALPEQUE HARBOUR\MALPEQUE_FIG5



<p>ESTIMATED EXTENT OF SOIL METAL IMPACTS MALPEQUE HARBOUR APPROACH RANGE SITES PRINCE COUNTY, PEI, LL#1066, 1067, 1068, 1069, LDU/PN #02175, 81101, 02176, 81102 RPIS#MB00064, MB00065, MB00066, MB00067 DEPARTMENT OF FISHERIES AND OCEANS</p>	<p>Date: 02 01 14</p> <p>Job No.: 13300-07</p>	<p>Scale: AS SHOWN</p> <p>Figure No.: 5</p>	<p>Jacques Whitford Consulting Engineers Environmental Scientists</p> <p><small>THIS DRAWING IS THE PROPERTY OF JACQUES WHITFORD AND IT SHALL NOT BE GIVEN OUT, COPIED OR DUPLICATED FOR THE USE OF ANOTHER BUT SHALL BE USED ONLY BY THE RECIPIENT FOR THE PURPOSE TO WHICH IT REFERS.</small></p>
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3.6.3 Petroleum Hydrocarbons in Soil

Four soil samples were submitted for petroleum hydrocarbon (BTEX/TPH) analysis (Table 13). Concentrations were below the Atlantic PIRI Tier I commercial criteria for petroleum hydrocarbons for a property having non-potable groundwater use and sand-type soil. Minor fuel/lube oil impacts were identified in the vicinity of SS-80 and minor lube range impacts were identified in the vicinity of SS-4. These impacts may be attributed to the presence of fill material, the reported former use of kerosene to fuel the range light and/or the former presence of a dwelling in this location.

Soil Petroleum Hydrocarbon Samples

- | |
|--|
| <ul style="list-style-type: none"> • 4 submitted • 0 exceeded for BTEX/TPH • [TPH] <32 to 92 mg/kg |
|--|

3.7 Quality Assurance/Quality Control Discussion

QA/QC sampling for the work conducted at the Malpeque Harbour Approach range lights consisted of the collection and analysis of approximately 10% blind duplicate samples for QC. This program permits the evaluation of the representativeness of the samples. The blind duplicate samples collected are as follows:

- PB12 (paint duplicate of PB9);
- DUP 30A (duplicate of SS-4A);
- DUP 20A (duplicate of SS-60A);
- DUP 31 (duplicate of SS4B); and,
- DUP 32 (duplicate of SS11A).

The laboratory also conducted their own QA/QC by creating duplicates of selected samples and conducting analyses of the same parameters. The laboratory duplicates analyzed are as follows:

- SS-6C DUP (laboratory duplicate of SS-6C); and,
- SS-12A DUP (laboratory duplicate of SS-12A).

The duplicate results generally agree closely with their corresponding samples and confirm the representativeness of the sampling procedures. The relative percent difference from the mean for individual metal parameters fell within a range of $\pm 15\%$, however, at normal concentration levels, a paint sample duplicate had a 67% difference from the mean and two soil duplicates had 59% and 54% difference from the mean. At low concentration levels, there were a few exceptions which did not fall into the $\pm 15\%$ range. There are no firm guidelines for the degree of correlation expected between soil field duplicates due to natural heterogeneity in soil type (e.g. grain size, clay fraction) and contaminant distribution. JWEL followed up with the laboratory on the 67% difference in iron concentration for the paint duplicate. The laboratory inspected the two samples submitted and reported that the field duplicate (PB 12) appeared to have a bit more dirt and substrate in it, which may account for the difference. However, the difference from the mean noted above is considered to indicate an acceptable duplicate correlation.

Table 13 - TPH/BTEX Concentrations in Soil

Parameter	Units	EQL	CCME Guidelines		Sample Identification				
			R	C	SS-4A	SS-61A	SS-80A	SS-104A	
			sample depth (mbgs)						
Benzene	mg/kg	0.025	0.5	5	nd	nd	nd	nd	
Toluene	mg/kg	0.025	0.8	0.8	nd	nd	nd	nd	
Ethylbenzene	mg/kg	0.025	1.2	20	nd	nd	nd	nd	
Xylenes	mg/kg	0.05	1	17	nd	nd	nd	nd	
C6 - C10 HC {less BTEX}	mg/kg	2.5	nc	nc	nd	nd	nd	nd	
>C10-C21 (Fuel Range)	mg/kg	15	nc	nc	nd	nd	21	nd	
>C21-C32 (Lube Range)	mg/kg	15	nc	nc	23	nd	71	nd	
Modified TPH - Tier 1	mg/kg	32	720	1740	nd	nd	92	nd	

Notes:

CCME Criteria - Canadian Council of Ministers of the Environment

Environmental Quality Criteria (1991 - 1999)

R/P - Residential/Parkland; C-Commercial

Modified TPH - Tier 1 criteria are for surface soils (top 1 m) on a site with sandy soil, potable groundwater use and fuel oil contamination.

EQL - estimated quantitation limit

nd - less than the EQL; nc - no criteria developed

Bold - sample concentration exceeds Commercial criteria

Notes:

CCME Criteria - Canadian Council of Ministers of the Environment

Environmental Quality Criteria (1991 - 1999)

R/P - Residential/Parkland; C-Commercial

Modified TPH - Tier 1 criteria are for surface soils (top 1 m) on a site with

sandy soil, potable groundwater use and fuel oil contamination.

EQL - estimated quantitation limit

nd - less than the EQL; nc - no criteria developed

nd - sample concentration exceeds Commercial criteria

In relation to the CCME commercial remediation criteria, all individual metals parameters in the duplicates were classified the same (either above or below criteria) as the same metal parameter reported for the corresponding soil or paint sample, excluding SS-4B which had lead concentrations below criteria, while its blind field duplicate had lead concentrations above criteria.

Background metal sample concentrations were lower than most other samples hence it is likely a representative background location.

3.8 Contaminant Distribution

3.8.1 Buildings/Structures

3.8.1.1 Metals Contamination from Paint

Lead based paint was found on the LL#1066 daymark and on the following exterior components of LL#1067: siding, trim, staircase, and steel framing. The interior paint of LL#1067 could not be analysed as the sample included asbestos-containing substrate; however, based on past experience it is expected that the interior paint is lead-containing. Five of the 11 paint samples exceeded 5000 mg/kg by up to a factor of 11. Approximate area of contaminated paint associated with LL#1067 (including the interior paint) and LL#1066 is estimated to be 200 m².

3.8.1.2 Asbestos-Containing Materials

Asbestos-containing materials were found on the interior fourth storey of LL#1067. Asbestos-containing materials included floor and wall board. The ceiling board, which could not be sampled during the site visit, appeared to be similar to the wall board and we have therefore, assumed it to be asbestos-containing. Both building materials submitted for asbestos analysis contained 20-40% Chrysotile. Approximate area of asbestos-containing materials associated with LL#1067 is estimated to be 50 m².

3.8.1.3 Soil

The magnitude of soil metals impacts associated with metals from paint, fill material, former on-site disposal of caustic soda batteries, or former reported lead battery electrolyte spillage is presented in Table 14.

Table 14 - Magnitude of Impact – Metals in Soil

Parameter	CCME Commercial Criteria (mg/kg)	# of Samples Exceeding Criteria	Exceedance Factor	Trends
Pb	260	5	up to 3.4x	For LL#1067 and concentric ring locations: appeared to diminish from source For in the vicinity of SS-7 location: horizontal and vertical delineation required
Zn	360	9	up to 30.6x	For LL#1067 and concentric ring locations: appeared to diminish from source Vertical delineation required in the vicinity of SS-1 and SS-2. Concentration increased with depth in the vicinity of SS-1. For in the vicinity of SS-7 location: horizontal and vertical delineation required
Hg	24	2	up to 5x	1 hot spot

Table 15 summarizes the extent of contamination associated with metals in soil and identifies if additional on or off site delineation is recommended.

Table 15 - Extent of Contamination – Metals in Soil

Issue	Comment	Recommendation
Horizontal Extent of Contamination	640 m ² impacted area around LL#1067. Assumed 60 m ² impacted area around SS 7.	Further on site delineation is required in the vicinity of SS-7.
Off site impacts?	Not expected.	None
Vertical Extent of Contamination	Maximum depth of soil contamination is 0.45 mbgs. Average depth of soil contamination is 0.25 mbgs.	Vertical extent is generally delineated in the vicinity of LL#1067 and the concentric ring locations. Vertical delineation is required in the vicinity of SS-7, SS-1 and SS-2.
Summary	Approximate volume of contaminated soil identified is 175 m ³ . Contaminant distribution is consistent with identified sources. Groundwater was not encountered; therefore, no groundwater concerns were identified.	

3.8.2 Soil Petroleum Hydrocarbon Contamination

Soil petroleum hydrocarbon contamination was not identified. Petroleum hydrocarbon impacts below guidelines were identified in the soil in the vicinity of SS-80 and SS-4. These impacts may be attributed to the presence of fill material, the reported former use of kerosene to fuel the range light and/or the former presence of a dwelling in this location.

4.0 SPECIAL DFO REPORTING REQUIREMENTS

4.1 Identification of Contaminated Sites

A contaminated site, as defined by the Contaminated Sites Management Working Group, is a site at which substances occur at concentrations (1) above background levels and pose, or are likely to pose, an immediate or long term hazard to human health or the environment, or (2) exceed levels specified in policies and/or regulations.

Table 16 summarizes the identified contaminated sites.

Table 16 - Contaminated Site Summary

Potential Area of Concern/Contaminated Site	Source	Contaminants of Concern	Supporting Documentation	NCS Class
Lead, zinc and mercury in soil around range light.	Lead Based Paint, batteries, fill	Pb, Zn, Hg,	Lab samples (see Figure 5)	Class 2

4.2 National Classification System (NCS) Summary

The NCS Detailed Evaluation Form was developed by the CCME to provide a nationally consistent ranking of the priority of sites in terms of potential remediation requirements. The evaluation process generally considers contaminant sources, exposure pathways, and potential human and environmental receptors, but is not intended to be used as a risk assessment tool. The scoring system reflects the concentrations and potential exposures of contaminants in relation to generic CCME remediation criteria, though some flexibility is provided for site-specific factors by the inclusion of Special Consideration scores, which can be either negative or positive. Table 17 outlines how the final site scores are categorized.

Table 17 - NCS Scoring Summary

Total Score	Class	Risk Potential	Action Required
70-100	Class 1	High	Yes
50-69	Class 2	Medium	Likely
38-49	Class 3	Medium-Low	May Be
≤37	Class N	Low	Not Likely
Estimated Score ≥ 15	Class I	Insufficient Information	Insufficient Information

The NCS Detailed Evaluation Form for the subject property are presented in Appendix G and a scoring summary for the site is presented in Table 18. The site obtained a score of 69 ± 7 and is classified as Class 2, medium risk potential, action likely required.

Table 18 - NCS Detailed Evaluation Form for Site 1

Factor Categories		Category Score	Estimated Score	Total Category Score	Total Estimated Score
I	Contaminant Characteristics	23	0	23	±0
II	Exposure Pathways	8	3		
	A Groundwater				
	B Surface Water				
	C Direct Contact				
Total		21.95	3.75	21.95	±3.75
III	Receptors	11	0	24	±3
	A Human and Animal				
	B Environment				
Total		24	3	24	±3
Classification				69	±7
				Total Score for this Site	Estimated Score for Site
				Class 2	

4.3 Water Lot Classification Using the Aquatic Sites Classification

There is no water lot associated with the range lights hence the water lot classification is not applicable.

4.4 RPIS

Information related to the DFO's Contaminated Sites Database is provided in Appendix F.

5.0 CONCLUSIONS

Based on the information gathered and on observations made during this investigation, the Phase I, II and III Environmental Site Assessment revealed evidence of potential environmental contamination associated with the subject property.

Results are as follows:

- lead, zinc and mercury concentrations above the CCME commercial values were found in soil samples on the 1 m and 10 m ring around LL#1067, as well as at three soil sample locations in the vicinity of LL#1067 where potential for contamination was suspected based on the presence of fill material and a portion of the former LL#1067 structure. The volume of contaminated soil is estimated as 175 m³. Further on site delineation would be required to delineate one area;
- paint at LL#1067 and LL#1066 exceed the Hazardous Products Regulations for lead of 5,000 mg/kg in five of the samples collected. The areal extent of the lead-based paint is estimated to be 200 m². The paint is not considered leachate toxic waste based on analysis of the two paint samples having the largest exceedance of 5,000 mg/kg lead;

- asbestos-containing materials were found on the interior fourth storey of LL#1067. Asbestos-containing materials included floor and wall board based on analysis of two building material samples. The ceiling, which could not be sampled during the site visit, appeared to be similar to the wall board and therefore, has been assumed to be asbestos-containing. New and old asphalt shingle samples were not collected at the time of the site visit. Asphalt shingle samples should be collected during follow-up work and be analyzed for asbestos content. Should asbestos be confirmed to be present then the shingles could be included in clean up of other site asbestos with minimal cost. Approximate area of asbestos-containing materials associated with LL#1067 is estimated to be 50 m²; and
- soil petroleum hydrocarbon concentrations were all below applicable criteria.

The ruin, which reportedly was potentially a former kerosene storage building could not be located. It is possible the ruin is no longer present due to shore line erosion.

The CCME National Classification System (NCS) detailed evaluation form was completed and the site was classified as Class 2, action likely required with a Final Score of 69 ± 7 . The Marine and Aquatic Site Ranking method was not conducted as the site does not have a water lot associated with it.

6.0 CLOSURE

This report has been prepared for the sole benefit of Public Works and Government Services Canada and the Department of Fisheries and Oceans. The report may not be relied upon by any other person or entity without the express written consent of Jacques Whitford Environment Limited (JWEL), Public Works and Government Services Canada, and Department of Fisheries and Oceans.

Any use which a third party makes of this report, any reliance on decisions made based on it, are the responsibility of such third parties. JWEL accepts no responsibility for damages, if any, suffered by any third party as a result of decisions or actions made based on this report.

Some of the information presented in this report was provided through existing documents and interviews. Although attempts were made, whenever possible, to obtain a minimum of two confirmatory sources of information, JWEL in certain instances has been required to assume that the information provided is accurate.

The conclusions and recommendations presented represent the best judgement of the assessor based on current environmental standards and on the site conditions observed on September 12 and 13, 2001. Due to the nature of the investigation and the limited data available, the assessor cannot warrant against undiscovered environmental liabilities. Since the purpose of a Phase I ESA is to identify potential or actual contamination, the identification of site conditions which may pose a non-environmental hazard to buildings, or people on the site, are beyond the scope of this report. Examples include but are not

limited to underground mine workings, volcanic or earthquake activities, severe weather, and/or flood plains in the area. JWEL accepts no responsibility for damages, if any suffered as a result of any non-environmental hazard.

s.19(1)

The conclusions are based on results from specific testing and/or sampling locations, and can only be extrapolated to an undefined limited area around these locations. The extent of the limited area depends on the soil and groundwater conditions, as well as the history of the site reflecting natural, construction and other activities. In addition, analysis has been carried out for a limited number of chemical parameters, and it should not be inferred that other chemical species are not present.

Should additional information become available, JWEL requests that this information be brought to our attention so that we may re-assess the conclusions presented herein. This report was prepared by [REDACTED] and reviewed by [REDACTED]

[REDACTED]
Site Assessor

[REDACTED]
Senior Reviewer

APPENDIX A

ASSESSOR QUALIFICATIONS

Page 61

**is withheld pursuant to section
est retenue en vertu de l'article**

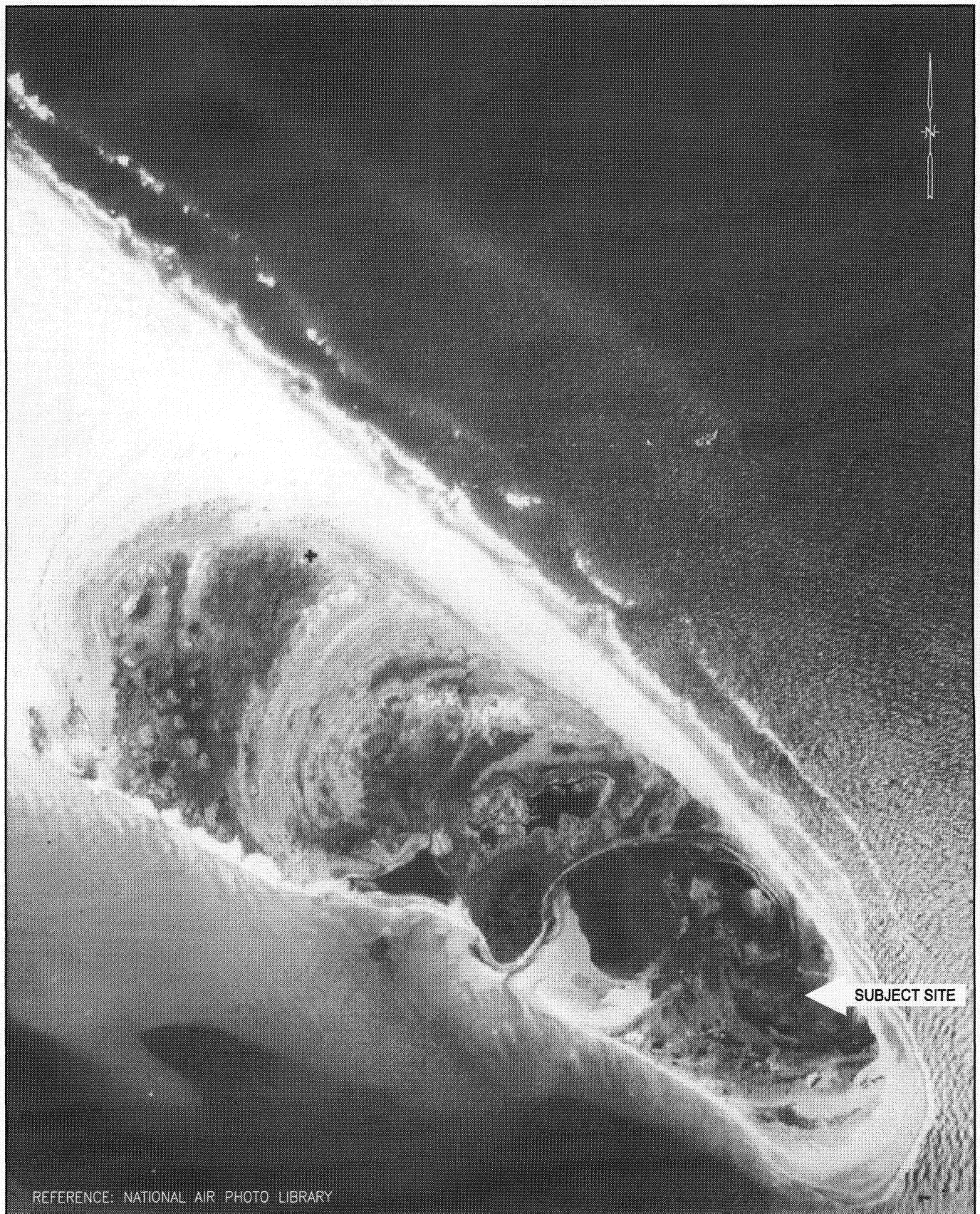
19(1)

**of the Access to Information Act
de la Loi sur l'accès à l'information**

APPENDIX B

AERIAL PHOTOGRAPHS

FILE: \13300\07 MALPEQUE_HARBOUR\MALPEQUE_HARBOUR_AERIAL_1935



REFERENCE: NATIONAL AIR PHOTO LIBRARY

1935 AERIAL PHOTOGRAPH
MALPEQUE HARBOUR APPROACH RANGE SITES
PRINCE COUNTY, PEI, LL# 1066, 1067, 1068, 1069
LDU/PN# 02175, 81101, 02176, 81102
RPIS# MB00064, MB00065, MB00066, MB00067
DEPARTMENT OF FISHERIES AND OCEANS

Date:
02 01 14

Scale:
NTS

Job No.:
13300-07

PHOTO No.:
9



Jacques Whitford

Consulting Engineers
Environmental Scientists


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FILE: \13300\07 MALPEQUE_HARBOUR\MALPEQUE_HARBOUR_AERIAL_1955




REFERENCE: NATIONAL AIR PHOTO LIBRARY

<p align="center">1955 AERIAL PHOTOGRAPH MALPEQUE HARBOUR APPROACH RANGE SITES PRINCE COUNTY, PEI, LL# 1066, 1067, 1068, 1069 LDU/PN# 02175, 81101, 02176, 81102 RPIS# MB00064, MB00065, MB00066, MB00067 DEPARTMENT OF FISHERIES AND OCEANS</p>	<p>Date: 02 01 14</p>	<p>Scale: NTS</p>	<p align="center"> Jacques Whitford Consulting Engineers Environmental Scientists</p> <p><small>THIS DRAWING IS THE PROPERTY OF JACQUES WHITFORD AND IT SHALL NOT BE GIVEN OUT, COPIED OR DUPLICATED FOR THE USE OF ANOTHER BUT SHALL BE USED ONLY BY THE RECIPIENT FOR THE PURPOSE TO WHICH IT REFERS.</small></p>
	<p>Job No.: 13300-07</p>	<p>PHOTO No.: 10</p>	

FILE: \13300\07 MALPEQUE HARBOUR\MALPEQUE HARBOUR_AERIAL_1974



REFERENCE: PEI DEPARTMENT OF FORESTRY

<p>1974 AERIAL PHOTOGRAPH MALPEQUE HARBOUR APPROACH RANGE SITES PRINCE COUNTY, PEI, LL# 1066, 1067, 1068, 1069 LDU/PN# 02175, 81101, 02176, 81102 RPIS# MB00064, MB00065, MB00066, MB00067 DEPARTMENT OF FISHERIES AND OCEANS</p>	<p>Date: 02 01 14</p>	<p>Scale: NTS</p>	<p> Jacques Whitford Consulting Engineers Environmental Scientists</p> <p><small>THIS DRAWING IS THE PROPERTY OF JACQUES WHITFORD AND IT SHALL NOT BE GIVEN OUT, COPIED OR DUPLICATED FOR THE USE OF ANOTHER BUT SHALL BE USED ONLY BY THE RECIPIENT FOR THE PURPOSE TO WHICH IT REFERS.</small></p>
	<p>Job No.: 13300-07</p>	<p>PHOTO No.: 11</p>	

FILE: \13300\07 MALPEQUE_HARBOUR\MALPEQUE_HARBOUR_AERIAL_1980



REFERENCE: PEI DEPARTMENT OF FORESTRY

<p>1980 AERIAL PHOTOGRAPH MALPEQUE HARBOUR APPROACH RANGE SITES PRINCE COUNTY, PEI, LL# 1066, 1067, 1068, 1069 LDU/PN# 02175, 81101, 02176, 81102 RPIS# MB00064, MB00065, MB00066, MB00067 DEPARTMENT OF FISHERIES AND OCEANS</p>	<p>Date: 02 01 14</p> <p>Job No.: 13300-07</p>	<p>Scale: NTS</p> <p>PHOTO No.: 12</p>	<div data-bbox="1208 1789 1273 1852"> </div> <p>Jacques Whitford Consulting Engineers Environmental Scientists</p> <p><small>THIS DRAWING IS THE PROPERTY OF JACQUES WHITFORD AND IT SHALL NOT BE GIVEN OUT, COPIED OR DUPLICATED FOR THE USE OF ANOTHER BUT SHALL BE USED ONLY BY THE RECIPIENT FOR THE PURPOSE TO WHICH IT REFERS.</small></p>
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FILE: \13300\07 MALPEQUE_HARBOUR\MALPEQUE_HARBOUR_AERIAL_1990




REFERENCE: PEI DEPARTMENT OF FORESTRY

<p align="center">1990 AERIAL PHOTOGRAPH MALPEQUE HARBOUR APPROACH RANGE SITES PRINCE COUNTY, PEI, LL# 1066, 1067, 1068, 1069 LDU/PN# 02175, 81101, 02176, 81102 RPIS# MB00064, MB00065, MB00066, MB00067 DEPARTMENT OF FISHERIES AND OCEANS</p>	Date: 02 01 14	Scale: NTS	<div data-bbox="1201 1785 1274 1858" style="display: inline-block; border: 1px solid black; padding: 2px; text-align: center;"> WV </div> <p>Jacques Whitford Consulting Engineers Environmental Scientists</p> <p><small>THIS DRAWING IS THE PROPERTY OF JACQUES WHITFORD AND IT SHALL NOT BE GIVEN OUT, COPIED OR DUPLICATED FOR THE USE OF ANOTHER BUT SHALL BE USED ONLY BY THE RECIPIENT FOR THE PURPOSE TO WHICH IT REFERS.</small></p>
	Job No.: 13300-07	PHOTO No.: 13	

FILE: \13300\07 MALPEQUE_HARBOUR\MALPEQUE_HARBOUR_AERIAL_1994




REFERENCE: PEI DEPARTMENT OF FORESTRY

<p align="center">1994 AERIAL PHOTOGRAPH MALPEQUE HARBOUR APPROACH RANGE SITES PRINCE COUNTY, PEI, LL# 1066, 1067, 1068, 1069 LDU/PN# 02175, 81101, 02176, 81102 RPIS# MB00064, MB00065, MB00066, MB00067 DEPARTMENT OF FISHERIES AND OCEANS</p>	<p>Date: 02 01 14</p>	<p>Scale: NTS</p>	<p align="center"> Jacques Whitford Consulting Engineers Environmental Scientists</p> <p><small>THIS DRAWING IS THE PROPERTY OF JACQUES WHITFORD AND IT SHALL NOT BE GIVEN OUT, COPIED OR DUPLICATED FOR THE USE OF ANOTHER BUT SHALL BE USED ONLY BY THE RECIPIENT FOR THE PURPOSE TO WHICH IT REFERS.</small></p>
	<p>Job No.: 13300-07</p>	<p>PHOTO No.: 14</p>	

FILE: \13300\07 MALPEQUE_HARBOUR\MALPEQUE_HARBOUR_AERIAL_1997



REFERENCE: PEI DEPARTMENT OF FORESTRY

1997 AERIAL PHOTOGRAPH MALPEQUE HARBOUR APPROACH RANGE SITES PRINCE COUNTY, PEI, LL# 1066, 1067, 1068, 1069 LDU/PN# 02175, 81101, 02176, 81102 RPIS# MB00064, MB00065, MB00066, MB00067 DEPARTMENT OF FISHERIES AND OCEANS	Date: 02 01 14	Scale: NTS	 Jacques Whitford Consulting Engineers Environmental Scientists
	Job No.: 13300-07	PHOTO No.: 15	

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APPENDIX C

RESOURCE INFORMATION/INTERVIEWS

REGULATORY CONTACTS AND HISTORICAL SOURCES

Source	Information/Contact
Prince Edward Island Department of Fisheries, Aquaculture and the Environment (PEIDFAE)	Mr. Danny McInnis, Field Supervisor (902) 368-5057
Environment Canada	Request submitted to Environment Canada by PWGSC
Aerial Photographs	1935, 1955, 1974, 1980, 1990, 1994 & 1997
City Directories	Not applicable
Fire Insurance Maps	Not applicable
CCG Office Files in Charlottetown	None available
CCG Office Files in Saint John	None available
CCG Office Files in Dartmouth	<p>Drawing No. A4073801 Malpeque Harbour Approach Range, PEI Back dated 19/12/00 provided by Dan MacNeil</p> <p>Atlantic Coast List of Lights, Buoys and Fog Signals 2001. 1992, 1976, 1958, and 1940 CCG Marine Programs/DFO</p> <p>Photographs of LL #1068 and 1069 in 1990 and 1998</p> <p>Photographs of LL #1066 and 1067 in 1990</p> <p>Photographs of LL#1069 and LL#1067 in 1987</p> <p>Photographs of LL #1066 and 1067 in 1986</p> <p>CCG Light Inspection Reports LL#1069 in 1998 (note – removed damaged equipment from fallen tower and solar hut. Installed equipment on newly erected and re-located tower)</p> <p>E-mail to Bev Cleveland from Danny Currie noting that LL#1069 was down over the embankment dated December 10, 1997. E-mail response from Bob MacMillan to Bev Cleveland indicating plan was to sling it to a safe location and leave it down for the winter.</p> <p>Letter dated January 6, 1989 from CMA, Dartmouth to CMM/c regarding the Malpeque Harbour, PEI – surplus light tower on Fish Island giving authority to “dispose of the structure as you see fit” and outlining Malpeque Historical Society’s interest in acquiring the structure.</p> <p>Letter dated May 20, 1989 from The Malpeque Historical Society to CCG regarding their agreement to take possession of the disposed range light and specifying a target date for removal of July 15, 1989 and no later than July 31, 1989.</p> <p>Drawing of Lighthouse Site, Fish Island Main Light, Lot of land acquired from G. Shelton Sharp 1941. Department of Transport Marine Branch dated 1941. (note – now referred to as LL#1067)</p> <p>Light Station Data LL#1067 dated May 29, 1991 (fixed, red skeleton tower, white enclosed upper portion date constructed 1959)</p> <p>Light Station Data LL#1066 dated May 29, 1991 (fixed, white daymark with vertical red stripe date constructed 1987 date established 1876)</p> <p>Light Station Data LL#1069 dated May 29, 1991 (white daymark with vertical red stripe date constructed 1959 date established 1911)</p> <p>Light Station Data LL#1068 dated May 29, 1991 (white daymark with fluorescent red vertical stripe date constructed 1959 date established 1911)</p>

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REGULATORY CONTACTS AND HISTORICAL SOURCES	
Source	Information/Contact
	<p>Draft Notices to Mariners</p> <p>Malpeque harbour Approaches survey sheet for LL#1066 and 1067. Surveyed 1976. Note: former LL#1066 was a white tower with red roof and a fixed white light, having a height of 7.4 meters</p> <p>Letter from A/CMM/C to CMA-Dartmouth dated July 12, 1988 note: "...LL#1066. This light was damaged two years ago in a fall storm and is now located on the beach. Foundation is tipped and the tower sustained some damage to the shingles but otherwise it is in sound condition....has now been replaced by a skeleton steel tower."</p> <p>Letter from CMMAE/C to CMADS dated April 15, 1987 note: "Both ranges and the front towers washed away in a severe fall storm"</p> <p>Letter to [REDACTED] from Charlottetown District Manager CCG informing CCG records only commence in 1910 but that the light was established in 1856. The letter also outlines the lightkeeper's names from 1910 to 1959 and that a caretaker was appointed in 1959 until CCG took over maintenance in 1966.</p> <p>Detailed location sketch with measurements to charted features for LL# 1066, 1067, 1068, and 1069 in early 1990's (approx. 1991) and of LL# 1068 and 1069 in late 1980's (approx. 1986)</p>
SCH Office Files in Moncton	None available
Previous Environmental Site Investigations from Other Sources	None available
Other Sources (maps, Figures, etc.)	<p>Property Maps Provided by PEI Geomatics Information Centre</p> <p>Chart No. 4491 Canada PEI - North Shore Malpeque Bay Surveyed by the Canadian Hydrographic Service 1955-58 first edition May 6, 1966 and re-printed February 1, 1980.</p> <p>Sheet No. 10 46 5500 63 700 of Hog Island, PEI dated May 1985 produced by Surveys & Mapping Division Land Registry and Information Services. Note (only shows LL #1067 and 1066)</p> <p>Province of PEI Agricultural Series NTS Ref 11 L 12 (East) Sheet 5B4 and 5 B1 - photo taken May 1970 and compiled October 1972</p> <p>Map 1366A Surficial Deposits of Prince Edward Island by V.K. Prest of Geological Survey of Canada Department of Energy, Mines, and Resources 1973</p> <p>Geological Map of Prince Edward island by H.W van Poll 1977, 1980, in part modified after V.K. Prest, 1962, 1972, and L. Frankel, 1966.</p>

INTERVIEW QUESTIONS

Interviewee: George Craig		Title: Navigational Aids Technician (CCG/DFO employee for 26 years and 18 years in current position)		Phone No. 902-566-7904	
Interviewer: [REDACTED]		Don't Know		Answers	
Questions					
Are buildings all privately-owned or are any owned by DFO/CCG?				They are owned by CCG/DFO.	
Describe ground cover at the site (grass, gravel, asphalt, concrete, soil, fill)? Has there been any fill brought in to the site, where was it placed, what was the source?				In the vicinity of LL#1067, there are tall bushes (approximately 5 feet high) and red shale. You'll need a pick and shovel. The other range light areas are sandy with marram grass.	
What is the site currently used for (if storage, what is stored)? How many/what type of buildings/structures are on site? Note existing positions/locations, time frames, ages, and reason for move/demolition (if demolition - note method) and current owner? Note any information on sale of structures and dates.				LL#1068 and 1069 are steel towers on 10' by 10' skids and solar powered. There is a small battery hut with wood and sheathed with metal having a pre-fabricated finish. They have lights on top and day marks. There are lead/acid batteries associated with each tower. LL#1066 is a skeleton steel tower with a wooden box with batteries in it. It's on a timber skid. LL#1067 is a skeleton steel tower with a wooden upper portion. It has a battery hut with metal siding and a concrete pier foundation.	
What was the site previously used for? Were there other buildings/structures on the site in the past, where were they? Note former positions/locations, time frames, ages, and reason for move/demolition (if demolition - note method) and former owner? Note any information on sale of structures and dates.				LL#1066 used to be a lighthouse. It is now at Cabot Park. It was about 25' high and approximately 10' by 10' at the base. It had a fixed light. There was a big storm and the shore line washed out beneath it. It was on a 10 degree slant. In 1987 the light was replaced with the tower. LL#1067 has been the same since I started. I used to lug zinc batteries to it and top with water. Then we would dump them on site. We have since cleaned the site up.	
Former/existing structure's power and heating supply/type(s)? if coal, note coal storage locations.				Not in my history. Light keeper may have.	

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Interviewee: George Craig		Title: Navigational Aids Technician (CCG/DFO employee for 26 years and 18 years in current position)		Phone No. 902-566-7904	
Interviewer: [REDACTED]		Don't Know		Answers	
Questions					
Any environmental issues of concern (spills in the area, upgradient or on-site landfills or waste disposals, area of fill placement on-site, air emissions of concern, current/historical pesticide/herbicide use, gas stations, vehicle maintenance, dry cleaners, tanneries, fish plants, foundries, etc)? Did they note any staining (approximate area of staining and type/source)?				Approximately 10 years ago, the LL#1069 battery hut tipped over. Lead/acid electrolyte spilled out. Nothing to clean. There was no mess when the big one tipped (LL#1066)	
Any standing water, drainage ditches or watercourses on subject property? note source of water or beginning of watercourse (upgradient lake, river, swamp, etc.)				No, but there is a lot of seaweed between LL#1067 and 1066. Seaweed covered large portions.	
Locations of former/existing fuel storage tanks (gas, diesel, lube, hydraulic, kerosene, underground and above ground, including waste tanks such as waste oil)?				No, not during my time.	
Use/locations of former/existing back-up generators (ACM, diesel tank, lube oil) or fog alarm (air compressor, diesel tank) and time frames?				No.	
Locations of former/existing chemical storage (method of storage, type of chemical, use and time frames)?				No.	
Battery use, storage, and method of disposal? Type of battery (lead, zinc)?				The current batteries are brought back to the shop.	
Electricity underground or above ground?				No underground or above ground.	
Former/existing structure building materials (including roof (asphalt singles?) and foundation type(creosote piles or wolmainized lumber)) - note required for all buildings as well as their current/historical use?				There is a ruin of an old foundation approximately 15' by 20' north of LL#1067. Was possibly a home or kerosene storage. LL#1066, 1068, and 1069 have either creosote timber or pressure-treated wood skids.	

Interviewee: George Craig		Title: Navigational Aids Technician (CCG/DFO employee for 26 years and 18 years in current position)		Phone No. 902-566-7904	
Interviewer: [REDACTED]		Don't Know		Answers	
Questions					
Former/existing lighting types - mercury vapour?				They all have 12 volt incandescent. Never mercury vapour as there would not have been enough power to run them.	
Ballasts associated with lighting?				No.	
Former/existing transformers - type and time frame? (Including Maritime Electric/NS & NB Power)				No. Solar regulators 19 volt to 13-14 volts for batteries.	
Any known PCBs, UFFI or asbestos?				LL#1067 used to be sheathed with asbestos board. We painted it white. It has been smashed up by vandalism.	
Any known lead piping, lead based paints, or other lead materials?				Only in the paint and batteries.	
Any known refrigeration equipment or air conditioning units?				No.	
Any fire extinguishing devices on the property?				No.	
Former/existing helicopter landing pad?				No.	
Locations/Dates of former/existing burn pits?				No.	
Subject and adjoining properties water supply - note former and existing well locations, decommissioned/in use, and time frames?				No.	
Subject property wastewater disposal - note former and existing septic tanks and fields, wastewater outlets and freshwater intakes?				No.	
Former/existing trenches, sump, oil-water separators, floor drain locations - discharge to?				No.	
Types of waste generated, process effluent, method of disposal/removal, frequency, commencing since what date, former disposal method, name of licensed contractor?				No.	
Any vehicle, boat, equipment, or forklift maintenance on-site or on adjoining properties?				No.	

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Interviewee: George Craig		Title: Navigational Aids Technician (CCG/DFO employee for 26 years and 18 years in current position)		Phone No. 902-566-7904
Interviewer: [REDACTED]				
Questions		Don't Know	Answers	
Any hydraulic lifts, hoists, or elevators? above ground or underground hydraulic oil chambers?			No.	
Any former/existing railway lines on-site or along property boundaries?			No.	
Any electronics on-site? age (PCBs)?			No PCBs. But yes electronics. Printed circuit boards for solar regulators.	

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Interviewee: Eric Topple		Title: Regional Surveyor/Property Management Officer (CCG/DFO)		Phone No. 902-426-6163	
Interviewer: [REDACTED]		Don't Know	Answers		
Review former/existing locations. Points of historical or environmental interest.			LL#1069, 1068, and 1066 are on skids and move around a lot (2-3 times) — but stay on the same line. The eastern shore erodes and some of them fall onto the beach. LL#1067 does not move. The western shore has minimal erosion. Mercury vapour lights were possible in the old ones (LL#1066 and 1067). There are little shacks with batteries in them. The former LL#1066 light had a 8' by 8' square concrete box base.		
Using information from historical List of Lights books for LL#1066, 1067, 1068, and 1069, I charted the historical positions. The charting revealed the former locations of the range lights to be in the Gulf of St. Lawrence. If I faxed you the pages from the historical List of Lights books that I used, would you be able to confirm or comment on the former locations being out in the Gulf of St. Lawrence?			Received your faxed information. We charted the former positions and it appears as though you are on the right track. One time, years ago, those lights were out in that area that shows to be water but at that time it was part of the island and has since eroded. If you look at the chart you can see the way the contours and water depths are and there is shoal water all around the area where the lights are plotting. I think at one time, years ago, those lights were located out there when that was dry land but as the point of the island eroded they had to be moved inward. So looks like you are on the right track with what you've got.		

Interviewee: Charlie MacDonald		Title: District Engineer (CCG/DFO)		Phone No. 902-566-7935	
Interviewer: [REDACTED]		Don't Know	Answers		
How was the former lighthouse at LL#1067 disposed of?		X			
We found the top to what we think is the former LL#1067. Have you found anything related to the former structure on past site visits?			No. We just got to the tower and do the required maintenance.		
Old aerial photos indicate that LL#1067 appeared to be a lighthouse with a home attached and there was also another building further away. Any idea of their former uses?			It wouldn't have been a home — likely only a cottage as that was only seasonal. The other building may have been for kerosene storage.		
Would the erosion be enough in that area that the land where the former building shows on the aerial photo would no longer be there?			The erosion in that area is relatively stable but then you can have a storm that will take away 100 feet. So it's possible.		
When were the solar huts constructed? What did they use prior to the solar huts?			Solar huts were built likely in 1985-86. Before that we used Cypel batteries that were stored in wooden battery boxes.		

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Interviewee: Charlie MacDonald		Title: District Engineer (CCG/DFO)		Phone No. 902-566-7935	
Interviewer: [REDACTED]		Don't Know		Answers	
Questions					
In 1959, the List of Lights books described the towers as being steel towers painted red and the daymarks as being white with a red diamond. During the site visit we noticed the towers to be unpainted and to have daymarks that were white with a red stripe - are these the same towers or were they replaced? What did they do with the old towers?				Yes, the original steel towers were black bare steel. We replaced those likely in the mid 1980's with new galvanized towers. The towers didn't last that long due to the weather conditions and corrosion. The old towers would have been brought back here to our shop.	
LL#1067 still had what appears to have been the black steel painted red and was heavily corroded				I don't recall it being replaced so it is likely the same one.	
The cabin that was destroyed by fire - do you recall seeing it? Would you know when it was constructed?				Yes, I think I do recall seeing it but I have no idea when it was built - it was not ours.	
Do you recall any kind of a clean up due to the use of the old Cypel or zinc batteries? Did the clean up involve the removal of any impacted soil?				Yes, in the 1980's we went around to most of all the site and collected any batteries we could find and took them to a landfill. No soil was removed - we only dug in the soil if we saw a battery buried there.	
Noted prior to the 1950's the current locations of some of the ranges was out in the water - do you think this would be possible?				Yes. The erosion of the beach and the changing of the channel has required that we move them around quite a bit.	



**Jacques Whitford
Environment Limited**

Consulting Engineers
Environmental Scientists

590 North River Road
Charlottetown, PE
Canada C1E 1K1

Tel: 902 566 2866
Fax: 902 566 2004

Environmental Impact Assessment
Environmental Engineering
Environmental Protection Planning
Hydrogeology
Air Quality
Public Consultation
Archaeology & Heritage Planning

Geotechnical Engineering
Materials Engineering & Research
Mining Engineering

Dartmouth, NS
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Port Hawkesbury, NS
Saint John, NB
Fredericton, NB
Moncton, NB
Bathurst, NB
Charlottetown, PE
St. John's, NF
Corner Brook, NF
Goose Bay, LAB
Hull, PQ
Ottawa, ON
Toronto, ON
Calgary, AB
Lethbridge, AB
Vancouver, BC
Freeport, ME
Mexico, DF
Moscow, Russia
Buenos Aires, Argentina

s.19(1)

August 14, 2001

Via facsimile: 368-5830

Project No. NBF13300-7

Mr. Danny McInnis
Environmental Protection Branch
Department of Fisheries, Aquaculture and Environment
PO Box 2000
Charlottetown, PE
C1A 7N8

Dear Mr. McInnis:

**Re: Phase I Environmental Site Assessment (ESA)
Fish Island, Prince Edward Island**

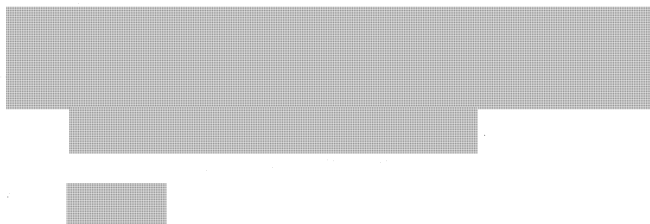
I am currently conducting an Environmental Site Assessment on a property in Fish Island, Prince Edward Island. Please check your records for this property regarding underground storage tanks or any non-compliance environmental issues that may be associated with the site, including all analytical test results you may have on file. The property is located at Fish Island, and consists of Property Number 553727.

In addition, any information that may be provided regarding neighboring properties would be greatly appreciated. The neighboring property numbers are: 553701, 553693 and 553719.

As our turnaround time is very short, your attention to this request at your earliest convenience is appreciated. To facilitate our billing system, please quote Project Number NBF13300-7 on your invoice for this audit information. If you have any questions, please call me at 566-2866.

Sincerely,

JACQUES WHITFORD ENVIRONMENT LIMITED



1000 [9409 ON YR/XL] 21 08/29/2001 WED

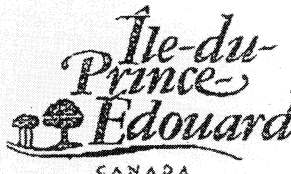
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Tel 902 368 5024
Fax 902 368 5830
www.gov.pe.ca/

Fisheries, Aquaculture
and Environment

Pollution Prevention Division
PO Box 2000
Charlottetown
Prince Edward Island
Canada C1A 7N8



TEL : 902 368 5024
Téléc. : 902 368 5830
www.gov.pe.ca/

Pêches, Aquaculture
et Environnement

Division de la prévention
de la pollution
C.P. 2000, Charlottetown
Île-du-Prince-Édouard
Canada C1A 7N8

August 29, 2001

Via Facsimile: 566-2004

Jacques Whitford Environment Ltd.
590 North River Road
Charlottetown, PE
C1E 1K1

Dear [REDACTED]

**RE: Phase I Environmental Site Assessment (ESA)
Fish Island, P.E.I.**

In response to your August 14, 2001-fax with respect to the status of the properties identified as PID#'s 553727, 553701, 553693, & 553719, the Department has no records on file for any non-compliance environmental issues, outstanding charges or Ministerial Orders, registered underground petroleum storage tanks, or operating air quality permits in connection with the above properties.

Please note effective April 1, 1997, the Environmental Audit & Contaminated Sites Administrative Fees Policy establishes fees for "Audit Request Responses." The attached invoice outlines these charges. Please forward a cheque payable to the Provincial Treasurer to our office at your earliest convenience.

If you have any questions regarding the above, please call me at (902) 368-5057.

Sincerely,

Danny McInnis
Field Supervisor

Enc
-11111

FEED FAX THIS END

FAX	
To:	[REDACTED]
Dept:	SWEL
Fax No.:	
No. of Pages:	1
From:	Corey Peters
Date:	Aug 29/01
Company:	SWEL
Fax No.:	
Comments:	

Environment
CanadaEnvironnement
Canada

Environmental Protection Branch
16th Floor, Queen Square
45 Alderney Drive
Dartmouth, NS B2Y 2N6

29 November 2001

Project #302716
Our file: 9114-1

Stephen Bourn
PWGSC, Environmental Services
3rd Floor, 1713 Bedford Row
Halifax, NS B3J 3C9

Dear Mr. Bourn: 

**Re: Results - Environmental Information Search Request
Thirty Three DFO Properties in the Maritime Provinces**

In response to your faxed letter of October 1, 2001, the relevant Sections of Environment Canada's Environmental Protection Branch (Atlantic Region) have searched their records for any pertinent environmental information regarding the thirty three Department of Fisheries and Oceans properties (see Attachment A) throughout the Maritime Provinces.

Environment Canada records of the Office of Enforcement, the Waste Management & Remediation Section, and the Environmental Emergencies Section were searched and the results are as follows:

Office of Enforcement found a reference to a spill at Port Mouton. As I could not determine where exactly the Port Mouton wharf light is located, I have included the spill information (see Attachment B). No documentation related to enforcement actions was identified;

Waste Management & Remediation Section found no related information; and,

Environmental Emergencies' search of their Atlantic Region Trends System (ARTS) database found spill reports related to the Harrington Storage Facility, the St. Andrews Biological Station, and one possibly related to the Cripple Creek property. As the Emergencies Section could not determine the physical proximity between the fog signal and a wharf, the report has been included. For details of the spills, see Attachment B. Please note the ARTS database was unable to be searched beyond the end of 1998 as the information is not available. If you have any questions concerning the ARTS search, contact Peter Hennigar at 902-426-6191.

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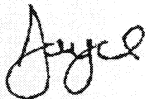
- 2 -

I would suggest that you may want to contact both the provincial Departments of Environment and the local municipalities concerning provincial legislation and regulations, and municipal requirements.

While the above information is correct and accurate to the best of our knowledge, it is the responsibility of the land owner/occupant to ensure compliance with all applicable regulations. Accordingly, this letter is written without prejudice to any future action which may be required for protection of public health and the environment.

An invoice for \$6270.00 will be forwarded to your office by our Finance Section to cover the cost of these searches.

Yours truly,



Joyce Dagnall
Administrative Officer

Attachments (2)

Attachment A.

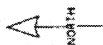
Site Name	Prov.	Site Category	Address / Description of Location	Lat	Long
Baccaro Storage Compound	NS	Storage	Located in East Baccaro, Shelburne Co., NS	43-27.600	65-28.205
Bunker Island	NS	Residential Site	Located on Bunker Island in Yarmouth Harbour	43.8132	66.1417
Cape Bonaventure VHF	NS	Remote	Highway 358, near Scots Bay, North East of Arlington	45-12-45	64-23-50
Cobequid Fish Culture	NS	Hatchery	1759 Williamsdale Road, RR#1 Collingwood, Williamsdale, Cumberland County, Nova Scotia, B0M 1E0	45.35	63.75
Cripple Creek Fog Signal (IL# 333-4)	NS	Fog Signal	Cripple Creek, E. side of Cape Sable Island, Shelburne Co., NS	43-29-20	65-33-36
Forbes Point	NS	Wharf	At the end of Forbes Point Rd. (which comes from HWY. 3), along Woods Harbour, Shelburne Co.	43.5378	65.744
Janvin Island Range Site (IL# 704.1)	NS	Range Site	On Janvin Island at Thomas Head, Isle Madame, Cape Breton, NS.	45-32-31	61-12-04
Morgan Falls Fishway	NS	Fishway	Osborne Road (HWY. 552), New Germany, Lunenburg Co. - Along the Lahave River	44-32.090	64-42.822
Petit-de-Grat Outer Range (IL# 714)	NS	Range Site	West shore of Petit de Grat Inlet, South of Boudreauville, Isle Madame, Cape Breton, NS	45-29-48	60-59-26
Point McNutts Island	NS	Boat House / Haulout	Part of McNutts Island, Cape Roseway, Shelburne Co., NS	43.6527	65.2935
Port Moulton Inner	NS	Wharf Light	On a Small Craft Harbour wharf located along the west shore of Jones Cove. The wharf is along HWY. 103 at the junction to the road leading to Central Port Moulton, in Queens Co., NS	?	?
St. Columba VHF	NS	Remote	In St. Columba, Victoria Co., Cape Breton, NS. The site is located south of Beaver Pond and North of Iona Rear and Highland Hill approx. 0.5 km off the highway between Iona and Little Narrows	45-59-11	60-51-23
St. Paul Island (IL# 1477)	NS	Light	St Paul Island is located approx. 25km off shore of Cape North, Cape Breton Island, NS.	47-11-02	60-09-44
Sydney Radar	NS	Electronics Facility	Located on Kilkenny Lake Road which connects HWY. 28 (Sydney to New Waterford) and Lingan Road in Cape Breton Co. Kilkenny road/HWY 28 junction is located north of South Bar.	46-10-18	60-11-31
Sydney VHF	NS	Electronics Facility	Located in Port Caledonia, east of Whelan Point, west of MacRae point, along the Atlantic Ocean	46-11-13	59-53-41
Upper Port La Tour	NS	SCH Wharf / Nav. Light	Located south of Upper Port La Tour and east of Seal Point in Shelburne Co., NS. The site is accessed via the Port La Tour Road.	43-30-20	65-28-11

Bedford Basin Marker	NS	Day Mark	This site comprises of 2 portions of land located on the Bedford Basin shore along the Bedford Highway. One site near Rockingham, the other approx 1.8km, towards Bedford, away from the first.	44.696	63.6607
Blackville Wardens Camp	NB	Field Camp	Located on Colonial Drive, Highway 118 near Coughlan along the Southwest Miramichi River (on the other side of the river from Blackville), Northumberland Co., NB.	46-44.505	65-49.506
Chatham Warehouse & Compound	NB	Storage	Located at Chatham Wharf, Water Street (south east of the intersection between Lower Water Street and Aberdeen Street), Chatham, Northumberland Co., NB.	47-02.093	65-27.945
Chebucto Head Measured Mile Beacon	NS	Vacant Land	Located approximately 15 km southeast of Halifax following Highway 349 & exiting on the Duncans Cove Road. (Chebucto Head at Cape Cove) The beacon is located <1km north of the lighthouse at Chebucto Head.		
Curventon Property	NB	Undeveloped Land	Located on HWY 425 near Curventon along the North West Miramichi River in North Esk, Northumberland Co., NB	47.05	65.883333
Gillis Cove Field Camp	NS	Field Camp	Located in Gillis Cove, Inverness Co. along the Alba Road between Orangedale and West Alba, Cape Breton, NS. The site is accessed via a 69m driveway from the Alba Road.	45-54.714	61-03.100
Harrington Storage Facility	PEI	Storage	Located on the Brackley Point Road (HWY. 15) between Brackley and Harrington, near Harrington, Queens Co., PEI. (Lot 33)	46-20.428	63-10.039
Hart Island Range Site (LL# 679, 679.1)	NS	Range Site	The lights are on Hart Island, in Canso Harbour, next to (east of) Piscataqui Island, Guysborough Co., NS.	45-20-37	60-59-28
Hartlen Point	NS	DGPS Station	Located near the end of Shore Road, close to the Hartlen Point Golf Club in South East Passage, Halifax Co., NS.	?	?
Lelang Salmon Farm	NB	Laboratory	Located at the end of the Lime Kiln Road (off of HWY 772) on the shore of Lelang Harbour in Charlotte Co., NB.	45.06667	66.816667
Malpeque Harbour Approach Range Site (LL#	PEI	Range Site	Located on Billhook Island (formerly Fish Island) at the end of the Malpeque Sand Hills, Malpeque Harbour, Prince Co., PEI	46-34-38	63-42-54
Miscou Island Marine Radio Beacon	NB	Remote	Located near Birch Point on the northern portion of Miscou Island, Gloucester Co., NB.	47-57-12	64-31-35
Mullins Point Front and Rear Range (LL# 922.923)	NS	Range Site	Located at the end of the peninsula which separates Fox Harbour and Wallace Harbour (near the north side of the entrance to Wallace Harbour), Cumberland Co., NS.	45-49-33	63-25-31

Neguac Storage Shed	NB	Storage	1 km from Route# 26, Lower Néguaac, New Brunswick, on lot next to shore on Cottage Road north of Neguac Wharf, Northumberland.	47-15.678	47-15.678
Palmer Point	NB	Wharf Light	Located near the mouth of Belleisle Bay on the east side of the St. John River near Tennants Cove, north of Palmer Point on Post Road, 29 miles north of St. John.	45-34-33	66-01-07
Red Head Remote Radar	NB	Remote	Located at the end of Proud Road on Red Head Mountain, south west of Calvert Lake and south east of Red Head, Saint John Co., NB.	45-14-00	65-59-05
St. Andrews Biological Station	NB	Research Station	531 Brandy Cove Rd., in the northern sector of St Andrews, Charlotte Co., NB	45.08333	67.05

• MGI Sites
• Jacques Whitford Sites

PEI GEOMATICS Owner Name: GOVERNMENT OF CANADA
INFORMATION CENTRE Location: FISH ISLAND



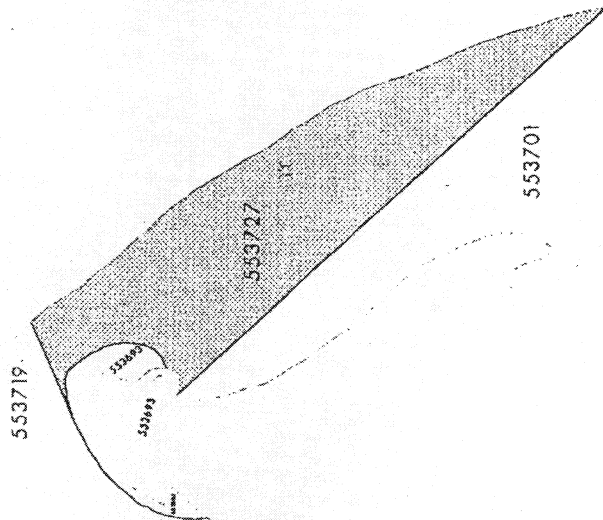
PROVINCE OF PEI DEPARTMENT
OF PROVINCIAL TREASURY
GEOMATICS INFORMATION CENTRE
11 KENT ST. CHARLOTTETOWN
PEI C1A 7N8
PHONE: 902-368-5167
FAX: 902-368-4399

WHILE THIS MAP MAY NOT BE
FREE FROM ERROR OR OMISSION
CARE HAS BEEN TAKEN TO ENSURE
THE BEST POSSIBLE QUALITY.
THIS MAP IS A GRAPHICAL
REPRESENTATION
IT IS NOT A SURVEY AND IS NOT
INTENDED TO BE USED FOR LEGAL
DESCRIPTIONS OR TO CALCULATE
EXACT DIMENSIONS OF AREAS

SCALE 1:10000

DATE: Thu. Jul 26, 2001

TIME: 09:25:30 AM



553719

PEI DEPARTMENT OF PROVINCIAL TREASURY
TAXATION AND PROPERTY RECORDS DIVISION
GEOMATICS INFORMATION CENTRE

Neighboring Properties Information Listing
For Property Number: 553727

July 26, 2001
Page 1

Parcel & Lease Stat	Owner Name & Mailing Address
-----	-----
553693- 0 A	GOVERNMENT OF CANADA GOVERNMENT SERVICES CANADA, MUNICIPAL GRANTS DIVISION, PO BOX 1268, CHARLOTTETOWN PEI C1A7M8
553701- 0 A	GOVERNMENT OF CANADA GOVERNMENT SERVICES CANADA, MUNICIPAL GRANTS DIVISION, PO BOX 1268, CHARLOTTETOWN PEI C1A7M8
553719- 0 A	GOVERNMENT OF CANADA GOVERNMENT SERVICES CANADA, MUNICIPAL GRANTS DIVISION, PO BOX 1268, CHARLOTTETOWN PEI C1A7M8

Total number of neighbors of this parcel is: 3

PEI DEPARTMENT OF PROVINCIAL TREASURY
TAXATION AND PROPERTY RECORDS DIVISION
HEMATICS INFORMATION CENTRE

Property Assessment Information Listing
BY Parcel Number

July 26, 2001
Page 1

Parcel	Map #	Property Location	Owner Name & Mailing Address
553727		FISH ISLAND	
Original Prop No:	0		GOVERNMENT OF CANADA GOVERNMENT SERVICES CANADA MUNICIPAL GRANTS DIVISION PO BOX 1268 CHARLOTTETOWN PEI C1A7M8
School District:	1600	PRINCE CO ISLANDS	
Work Unit:	7600	PRINCE CO ISLANDS	
Lot, Township #:	13		
School Unit #:	1		

Parcel & Lease	Acreage	Assessment Values	Designated Taxpayer & Mailing Address
553727- 0	79.000	Commercial: \$0 Non Commercial: \$11,100 Residential: \$0 Farm: \$0	
Account Status:	A		
Farm Qualification:	N		

Municipality:	0	CLARK MARLENE	Assessment Effective: 2001-01-01
Region # & Assr:	4		Last Inspection: 1988-01-20
% in Municip:	0		Last Owner Chg: 1977-01-01
Spec Prop Code:	199		Initially Filed: 0000-00-00
MUN Number:			Dormant: 0000-00-00
Owner ID Code:	411	No. Farm Qual:	0
Ownership Code:	C61	No. Referrals:	0
Tax Exempt Code:	901	No. Transfers:	0
		No. Tax Credits:	0
		No. Building Permits:	0
		No. Appeals:	0

REI DEPARTMENT OF PROVINCIAL TREASURY
TAXATION AND PROPERTY RECORDS DIVISION
GEOMATICS INFORMATION CENTRE

Registry Information Listing
BY Parcel Number

July 26, 2001
Page 1

Parcel	Map Numbers	Property Location	Owner(s) Name(s)
553727	11L125B1	FISH ISLAND	8 GOVERNMENT OF CANADA

County: Offshore

Status: Active
Last Parcel Update: 80-03-17
Parent Nos

Documents filed on or before Dec. 31, 1995

Acres: 79.00
School District: 4001
Lot/Township: 11
Province Code: 3

DOCUMENTS FILED ON PARCEL:

Seq No	Year	Description	Type	Doc No	Liber/ Folio/ Book Page
1942		ESTATE DEED (EXECUTORS' OR ADMINISTRATORS' DEEDS)	12	19420268	87 237
0000		PRELIMINARY CERTIFICATE	93	54604	

PEI DEPARTMENT OF PROVINCIAL TREASURY
TAXATION AND PROPERTY RECORDS DIVISION
GEOMATICS INFORMATION CENTRE

Property Assessment Information Listing
BY Parcel Number

October 03, 2001
Page 1

Parcel # 553701
Map #
Property location
Owner Name & Mailing Address

LAND
FISH ISLAND

GOVERNMENT OF CANADA
GOVERNMENT SERVICES CANADA
MUNICIPAL GRANTS DIVISION
PO BOX 1268
CHARLOTTETOWN PEI C1A7N8

Original Prop No: 0
School District: 1600 PRINCE CO ISLANDS
Work Unit: 7600 PRINCE CO ISLANDS

Lot/Township #: 11
School Unit #: 1

Parcel & Lease
553701- 0
Account Status: A
Farm Qualification: N

Acreage 32.000
Assessment Values
Commercial: \$0
Non Commercial: \$4,500
Residential: \$0
Farm: \$0

Designated Taxpayer & Mailing Address

Municipality: 0
Region # & Asst: 4
% in Municip: 0
Spec Prop Code: 199
MHI Number:

CLARK MARLENE

Owner ID Code: 411
Ownership Code: C61
Tax Exempt Code: 902

No. Farm Qual: 0
No. Referrals: 0
No. Transfers: 0
No. Tax Credits: 0
No. Building Permits: 0
No. Appeals: 0

Assessment Effective: 2001-01-01
Last Inspection: 1988-01-20
Last Owner Chg: 1977-01-01
Initially Filed: 0000-00-00
Dormant: 0000-00-00

PEI DEPARTMENT OF PROVINCIAL TREASURY
TAXATION AND PROPERTY RECORDS DIVISION
GEOMATICS INFORMATION CENTRE

Registry Information Listing
BY Parcel Number

October 03, 2001
Page 1

Parcel 553701 Map Numbers 11L125B1 Property Location FISH ISLAND Owner(s) Name (s) 8 GOVERNMENT OF CANADA

Status: Active
Last Parcel Update: 80-02-26
Acres: 32.00
School District: 4001
Tot/Township: 11
Province Code: 3

Documents filed on or before Dec. 31, 1995

DOCUMENTS FILED ON PARCEL:

Seq No	Year	Description	Type	Doc No	Liber/ Folio/ Book Page
2	1942	ESTATE DEED (EXECUTORS' OR ADMINISTRATORS' DEEDS)	12	19420268	87 237
1	0000	PRELIMINARY CERTIFICATE	93	54607	

PEI DEPARTMENT OF PROVINCIAL TREASURY
TAXATION AND PROPERTY RECORDS DIVISION
GEOMATICS INFORMATION CENTRE

Neighboring Properties Information Listing
For Property Number: 553701

October 03, 2001
Page 1

Parcel & Lease Stat

553727- 0 A

Owner Name & Mailing Address

GOVERNMENT OF CANADA

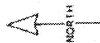
GOVERNMENT SERVICES CANADA

MUNICIPAL SERVICES DIVISION, 20 BOX 118, CHARLOTTETOWN, PEI C1A 1N6

Total number of neighbors of this parcel is: 1

PEI GEOMATICS INFORMATION CENTRE
Owner Name: GOVERNMENT OF CANADA
Location: LAND, BILL HOOK ISLAND

000000



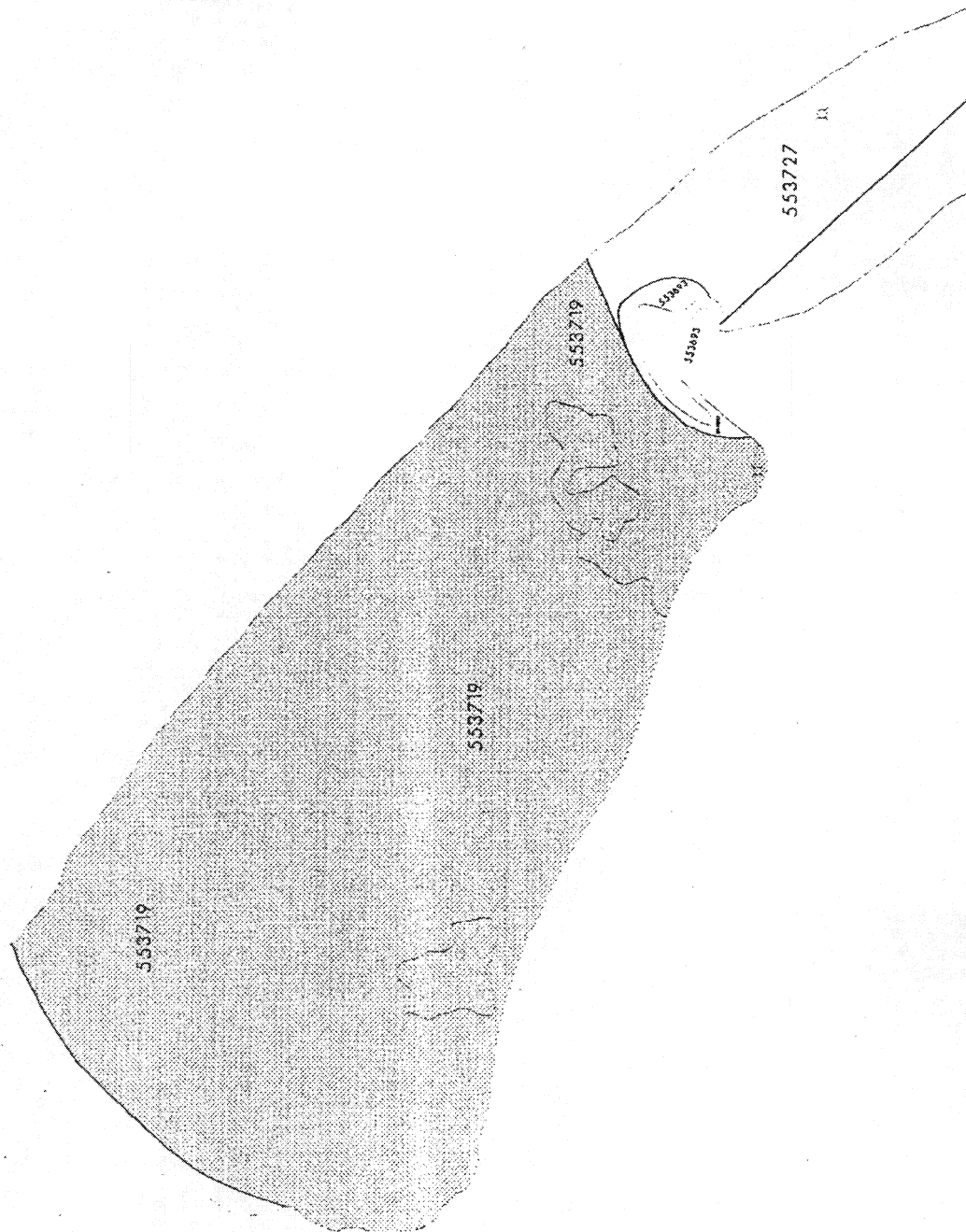
PROVINCE OF PEI DEPARTMENT
OF PROVINCIAL TREASURY
GEOMATICS INFORMATION CENTRE
11 KENT ST. CHARLOTTETOWN
PEI C1A 7N8
PHONE: 902-368-5167
FAX: 902-368-4399

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EXACT DIMENSIONS OR AREAS

SCALE 1:10000

DATE: Thu, Jul 26, 2001

TIME: 09:24:27 AM



PEI DEPARTMENT OF PROVINCIAL TREASURY
TAXATION AND PROPERTY RECORDS DIVISION
GEOMATICS INFORMATION CENTRE

Neighboring Properties Information Listing
For Property Number: 553719

July 26, 2001
Page 1

Parcel & Lease Stat	Owner Name & Mailing Address
553693- 0 A	GOVERNMENT OF CANADA GOVERNMENT SERVICES CANADA, MUNICIPAL GRANTS DIVISION, PO BOX 1268, CHARLOTTETOWN PEI C1A7M8
553727- 0 A	GOVERNMENT OF CANADA GOVERNMENT SERVICES CANADA, MUNICIPAL GRANTS DIVISION, PO BOX 1268, CHARLOTTETOWN PEI C1A7M8

Total number of neighbors of this parcel is: 2

DEPARTMENT OF PROVINCIAL TREASURY
TAXATION AND PROPERTY RECORDS DIVISION
HEMATICS INFORMATION CENTRE

Lease Codes Information Listing

July 26, 2001
Page 1

Parcel & Lease Stat	Acreage	Tax Payer/Lessee Name & Mailing Address
553719-101 A	0.000	GOVERNMENT OF CANADA

Total number of leases for parcel is: 1

PEI DEPARTMENT OF PROVINCIAL TREASURY
TAXATION AND PROPERTY RECORDS DIVISION
GEOMATICS INFORMATION CENTRE

Property Assessment Information Listing
BY Parcel Number

July 26, 2001
Page 1

Parcel	Map #	Property Location	Owner Name & Mailing Address
553719		LAND BILL HOOK ISLAND	GOVERNMENT OF CANADA GOVERNMENT SERVICES CANADA MUNICIPAL GRANTS DIVISION PO BOX 1268 CHARLOTTETOWN PEI C1A7M8
Original Prop Nc:	0		
School District:	1600	PRINCE CO ISLANDS	
Work Unit:	7600	PRINCE CO ISLANDS	
Lo ownship #:	13		
School Unit #:	2		

Parcel & Lease	Acreage	Assessment Values	Designated Taxpayer & Mailing Address
553719- 0	166.000	Commercial: \$0 Non Commercial: \$23,300 Residential: \$0 Farm: \$0	
Account Status:	A		
Farm Qualification:	N		

Municipality:	0	CLARK MARLENE	Assessment Effective: 2001-01-01
Region # & Assr:	4		Last Inspection: 1988-01-20
% in Municip:	0		Last Owner Chg: 1977-01-01
Spec Prop Code:	199		Initially Filed: 0000-00-00
MHI Number:			Dormant: 0000-00-00
Owner ID Code:	411		
Ownership Code:	C61		
Tax Exempt Code:	902		
		No. Farm Qual:	0
		No. Referrals:	0
		No. Transfers:	0
		No. Tax Credits:	0
		No. Building Permits:	0
		No. Appeals:	0

PEI DEPARTMENT OF PROVINCIAL TREASURY
TAXATION AND PROPERTY RECORDS DIVISION
GEOMATICS INFORMATION CENTRE

Registry Information Listing
BY Parcel Number

July 26, 2001
Page 1

Parcel 553719 Map Numbers 11L125C3
Property Location BILLHOOK ISLAND
Owner(s) Name(s) 8 GOVERNMENT OF CANADA

County: Offshore

Parent Nos

Status: Active
Last Parcel Update: 80-02-26
Documents filed on or before Dec. 31, 1995

Acres: 166.00
School District: 4001
Lot/Township: 11
Province Code: 3

DOCUMENTS FILED ON PARCEL:

Seq No	Year	Description	Type	Doc No	Liber/ Book	Folio/ Page
1	1942	DEED	11	19420268	97	237
2	1924	DEED	11	19240015	63	481
3	1796	DEED	11	17960000	8	131
1	1794	DEED	11	17940000	6	353
1	0000	PRELIMINARY CERTIFICATE	93	54603		

APPENDIX D

APPLICABLE REGULATIONS AND GUIDELINES

FEDERAL

Legislation

Canadian Environmental Protection Act:

Storage of PCB Material Regulations (SOR/92-507)

Federal Aboveground Storage Tank Technical Guidelines

Federal Underground Storage Tank Technical Guidelines

Chlorobiphenyls Regulation (SOR/91-152)

Registration of Storage Tank Systems for Petroleum Products and Allied Petroleum Products on Federal
Lands Regulations

Hazardous Products Act

Canada Water Act:

Guidelines for Canadian Drinking Water Quality

Guidelines for Effluent Quality and Wastewater Treatment at Federal Establishments

Water Quality Guidelines for the Protection of Aquatic Life

Fisheries Act

Transportation of Dangerous Goods Act/Regulations

Policies, Guidelines, and Codes

Canadian Council of Ministers of the Environment (CCME):

- Environmental Code of Practice for Underground Storage Tanks Containing Petroleum Products and Allied Petroleum Products, March 1993
- Environmental Code of Practice for Aboveground Storage Tanks Containing Petroleum Products, 1993
- Soil Quality Guidelines for the Protection of Environmental and Human Health, 1999
- The Canadian Sediment Quality Guidelines for the Protection of Aquatic Life, 1999

Government of Canada Asbestos Abatement Guidelines, 1991-01-04

Code of Good Practice for Handling Solid Wastes at Federal Establishments (Environment Canada)

Guidelines for Effluent Quality and Wastewater Treatment at Federal Establishments (EPS-1-EC-76-1)

PROVINCIAL

Prince Edward Island

Environmental Protection Act

Pesticides Control Act

Water and Sewerage Act

Petroleum Contaminated Site Remediation Guidelines

APPENDIX E

LABORATORY ANALYSIS REPORTS



ANALYTICAL SERVICES

Inorganic Parameters

page : 1

s.19(1)

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth

NS B3B 1W8

PSC Project Number : 0113573H

Client Project Number : NBF 13300-7

FAX # : 468-9009

Printed : 2001/10/05

Reported : 2001/10/05

Matrix			Soil	Soil	Soil	Soil
Philip ID			01-H061357	01-H061358	01-H061359	01-H061360
Client ID			SS-60A	SS-61A	SS-62A	SS-63A
Date Sampled (y/m/d)						
Date Received (y/m/d)			01/09/27	01/09/27	01/09/27	01/09/27
Analyte	Units	EQL				
HNO3 Peroxide Digestion		-	20011002-A	20011002-B	20011002-B	20011002-B
Mercury Digestion		-	20011002-D	20011002-D	20011002-D	20011002-D
Aluminum	mg/kg	10	1100	1200	1400	1500
Antimony	mg/kg	2.	nd	nd	nd	nd
Antimony Recovery	%	-	40.	40.	40.	40.
Arsenic	mg/kg	2.	nd	nd	nd	nd
Barium	mg/kg	5.	nd	nd	nd	nd
Beryllium	mg/kg	5.	nd	nd	nd	nd
Boron	mg/kg	5.	nd	nd	nd	nd
Cadmium	mg/kg	0.3	nd	nd	nd	nd
Chromium	mg/kg	2.	2.	2.	3.	3.
Cobalt	mg/kg	1.	1.	1.	1.	1.
Copper	mg/kg	2.	nd	nd	nd	nd
Iron	mg/kg	20	2100	2200	2500	2700
Iron Recovery	%	-	90.	90.	90.	90.
Lead	mg/kg	0.5	0.9	0.9	0.9	0.9
Manganese	mg/kg	2.	30.	31.	36.	39.
Molybdenum	mg/kg	2.	nd	nd	nd	nd
Nickel	mg/kg	2.	2.	3.	3.	3.
Selenium	mg/kg	2.	nd	nd	nd	nd
Silver	mg/kg	0.5	nd	nd	nd	nd
Strontium	mg/kg	5.	nd	nd	nd	nd
Thallium	mg/kg	0.1	nd	nd	nd	nd
Uranium	mg/kg	0.1	0.2	0.2	0.1	0.1

Legend:

EQL = Estimated Quantitation Limit for routine analysis
nd = not detected above standard EQL
nd() = not detected at the elevated EQL specified due to matrix interferences or sample pre-dilution
- = Parameter not requested in Sample

Note : Soil results are expressed as air dry weight basis.
Biota results are expressed on a wet weight basis unless otherwise stated.

page verified



Inorganic Parameters

page . 2

s.19(1)

PSC Analytical Services
200 Bluewater Road
Bedford, NS Canada B4B 1G9
Tel (902) 420-0203
Toll free (800) 565-7227
Fax (902) 420-8612

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0113573H
Client Project Number : NBF 13300-7

FAX # : 468-9009
Printed : 2001/10/05
Reported : 2001/10/05

Matrix	Soil	Soil	Soil	Soil
Philip ID	01-H061357	01-H061358	01-H061359	01-H061360
Client ID	SS-60A	SS-61A	SS-62A	SS-63A
Date Sampled (y/m/d)				
Date Received (y/m/d)	01/09/27	01/09/27	01/09/27	01/09/27

Analyte Units EQL (Continued from previous page)

Vanadium	mg/kg	2.	4.	4.	3.	4.
Zinc	mg/kg	2.	16.	27.	28.	16.
Mercury	mg/kg	0.01	nd	nd	nd	nd

Legend:

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page verified

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Dartmouth
NS B3B 1W8
PSC Project Number : 0113573H
Client Project Number : NBF 13300-7

FAX # : 468-9009
Printed : 2001/10/05
Reported : 2001/10/05

Matrix			Soil	Soil	Soil	Soil
Philip ID			01-H061361	01-H061362	01-H061363	01-H061364
Client ID			SS-40A	SS-41A	SS-42A	SS-42A DUP
Date Sampled (y/m/d)						
Date Received (y/m/d)			01/09/27	01/09/27	01/09/27	01/09/27
Analyte	Units	EQL				DUP
HNO3 Peroxide Digestion	-	-	20011002-B	20011002-B	20011002-B	20011002-B
Mercury Digestion	-	-	20011002-D	20011002-D	20011002-D	20011002-D
Aluminum	mg/kg	10	1300	1300	1000	1200
Antimony	mg/kg	2.	nd	nd	nd	nd
Antimony Recovery	%	-	40.	40.	40.	40.
Arsenic	mg/kg	2.	nd	nd	nd	nd
Barium	mg/kg	5.	nd	nd	nd	nd
Beryllium	mg/kg	5.	nd	nd	nd	nd
Boron	mg/kg	5.	nd	nd	nd	nd
Cadmium	mg/kg	0.3	nd	nd	nd	nd
Chromium	mg/kg	2.	3.	2.	2.	2.
Cobalt	mg/kg	1.	1.	1.	1.	1.
Copper	mg/kg	2.	nd	nd	nd	nd
Iron	mg/kg	20	2500	2300	1900	2200
Iron Recovery	%	-	90.	90.	90.	90.
Lead	mg/kg	0.5	1.2	0.9	0.6	0.6
Manganese	mg/kg	2.	34.	32.	27.	32.
Molybdenum	mg/kg	2.	nd	nd	nd	nd
Nickel	mg/kg	2.	3.	3.	2.	2.
Selenium	mg/kg	2.	nd	nd	nd	nd
Silver	mg/kg	0.5	nd	nd	nd	nd
Strontium	mg/kg	5.	nd	nd	nd	nd
Thallium	mg/kg	0.1	nd	nd	nd	nd
Uranium	mg/kg	0.1	0.1	0.1	0.1	0.1

Legend:

EQL = Estimated Quantitation Limit for routine analysis
nd = not detected above standard EQL
nd() = not detected at the elevated EQL specified due to matrix interferences or sample pre-dilution
- = Parameter not requested in Sample

Note : Soil results are expressed as air dry weight basis.
Biota results are expressed on a wet weight basis unless otherwise stated.

page verified

PSC Analytical Services
200 Bluewater Road
Bedford, NS Canada B4B 1G9
Tel (902) 420-0203
Toll free (800) 565-7227
Fax (902) 420-8612

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0113573H
Client Project Number : NBF 13300-7

FAX # : 468-9009
Printed : 2001/10/05
Reported : 2001/10/05

Matrix	Soil	Soil	Soil	Soil
Philip ID	01-H061361	01-H061362	01-H061363	01-H061364
Client ID	SS-40A	SS-41A	SS-42A	SS-42A DUP
Date Sampled (y/m/d)				
Date Received (y/m/d)	01/09/27	01/09/27	01/09/27	01/09/27

Analyte	Units	EQL	(Continued from previous page)			
Vanadium	mg/kg	2.	3.	3.	4.	2.
Zinc	mg/kg	2.	13.	12.	10.	11.
Mercury	mg/kg	0.01	nd	nd	nd	nd
01-H061364 SS-42A DUP		Antimony is 55 % recovery in the digested matrix spike.				

Legend:

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nd = not detected above standard EQL
nd() = not detected at the elevated EQL specified due to matrix interferences or sample pre-dilution
- = Parameter not requested in Sample
Note : Soil results are expressed as air dry weight basis.
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page verified

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Dartmouth
NS B3B 1W8
PSC Project Number : 0113573H
Client Project Number : NBF 13300-7

FAX # : 468-9009
Printed : 2001/10/05
Reported : 2001/10/05

Matrix			Soil	Soil	Soil	Soil
Philip ID			01-H061365	01-H061366	01-H061367	01-H061368
Client ID			SS-43A	SS-20A	SS-21A	SS-22A
Date Sampled (y/m/d)						
Date Received (y/m/d)			01/09/27	01/09/27	01/09/27	01/09/27
Analyte	Units	EQL				
HNO3 Peroxide Digestion	-		20011002-B	20011002-B	20011002-B	20011002-B
Mercury Digestion	-		20011002-D	20011002-D	20011002-D	20011002-D
Aluminum	mg/kg	10	1400	1500	1200	1200
Antimony	mg/kg	2.	nd	nd	nd	nd
Antimony Recovery	%	-	40.	40.	40.	40.
Arsenic	mg/kg	2.	nd	nd	nd	nd
Barium	mg/kg	5.	nd	nd	nd	nd
Beryllium	mg/kg	5.	nd	nd	nd	nd
Boron	mg/kg	5.	nd	nd	nd	nd
Cadmium	mg/kg	0.3	nd	nd	nd	nd
Chromium	mg/kg	2.	3.	3.	2.	2.
Cobalt	mg/kg	1.	1.	1.	1.	1.
Copper	mg/kg	2.	nd	nd	nd	nd
Iron	mg/kg	20	2600	2700	2300	2300
Iron Recovery	%	-	90.	90.	90.	90.
Lead	mg/kg	0.5	1.1	0.9	0.9	0.7
Manganese	mg/kg	2.	37.	36.	33.	30.
Molybdenum	mg/kg	2.	nd	nd	nd	nd
Nickel	mg/kg	2.	3.	3.	3.	2.
Selenium	mg/kg	2.	nd	nd	nd	nd
Silver	mg/kg	0.5	nd	nd	nd	nd
Strontium	mg/kg	5.	nd	nd	nd	nd
Thallium	mg/kg	0.1	nd	nd	nd	nd
Uranium	mg/kg	0.1	0.1	0.1	0.2	0.1

Legend:

EQL = Estimated Quantitation Limit for routine analysis
nd = not detected above standard EQL
nd() = not detected at the elevated EQL specified due to matrix interferences or sample pre-dilution
- = Parameter not requested in Sample

Note : Soil results are expressed as air dry weight basis.
Biota results are expressed on a wet weight basis unless otherwise stated.

page verified

PSC Analytical Services
200 Bluewater Road
Bedford, NS Canada B4B 1G9
Tel (902) 420-0203
Toll free (800) 565-7227
Fax (902) 420-8612

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0113573H
Client Project Number : NBF 13300-7

FAX # : 468-9009
Printed : 2001/10/05
Reported : 2001/10/05

Matrix	Soil	Soil	Soil	Soil
Philip ID	01-H061365	01-H061366	01-H061367	01-H061368
Client ID	SS-43A	SS-20A	SS-21A	SS-22A
Date Sampled (y/m/d)				
Date Received (y/m/d)	01/09/27	01/09/27	01/09/27	01/09/27

Analyte Units EQL (Continued from previous page)

Analyte	Units	EQL	2.	3.	3.	4.	6.
Vanadium	mg/kg	2.	3.	3.	4.	6.	
Zinc	mg/kg	2.	15.	10.	10.	9.	
Mercury	mg/kg	0.01	nd	nd	nd	nd	

Legend:

EQL = Estimated Quantitation Limit for routine analysis
nd = not detected above standard EQL
nd() = not detected at the elevated EQL specified due to matrix interferences or sample pre-dilution
- = Parameter not requested in Sample

Note : Soil results are expressed as air dry weight basis.
Biota results are expressed on a wet weight basis unless otherwise stated.

page verified

Inorganic Parameters

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PSC Analytical Services
200 Bluewater Road
Bedford, NS Canada B4B 1G9
Tel (902) 420-0203
Toll free (800) 565-7227
Fax (902) 420-8612

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0113573H
Client Project Number : NBF 13300-7

FAX # : 468-9009
Printed : 2001/10/05
Reported : 2001/10/05

Matrix	Soil	Soil	Soil	Soil
Philip ID	01-H061369	01-H061370	01-H061371	01-H061372
Client ID	SS-23A	SS-1A	SS-2A	SS-3A
Date Sampled (y/m/d)				
Date Received (y/m/d)	01/09/27	01/09/27	01/09/27	01/09/27

Analyte	Units	EQL				
HNO3 Peroxide Digestion	-		20011002-B	20011002-B	20011002-B	20011002-B
Mercury Digestion	-		20011002-D	20011002-D	20011002-D	20011002-D
Aluminum	mg/kg	10	1300	10000	7000	5700
Antimony	mg/kg	2.	nd	nd	nd	nd
Antimony Recovery	%	-	40.	40.	40.	40.
Arsenic	mg/kg	2.	nd	2.	2.	nd
Barium	mg/kg	5.	nd	22.	31.	48.
Beryllium	mg/kg	5.	nd	nd	nd	nd
Boron	mg/kg	5.	nd	nd	nd	nd
Cadmium	mg/kg	0.3	nd	0.5	2.1	nd
Chromium	mg/kg	2.	3.	11.	11.	5.
Cobalt	mg/kg	1.	1.	5.	4.	3.
Copper	mg/kg	2.	nd	8.	10.	3.
Iron	mg/kg	20	2500	9000	7700	7100
Iron Recovery	%	-	90.	90.	90.	90.
Lead	mg/kg	0.5	0.7	100	97.	130
Manganese	mg/kg	2.	34.	680	850	1600
Molybdenum	mg/kg	2.	nd	nd	nd	nd
Nickel	mg/kg	2.	3.	12.	10.	5.
Selenium	mg/kg	2.	nd	nd	nd	nd
Silver	mg/kg	0.5	nd	nd	nd	nd
Strontium	mg/kg	5.	nd	nd	6.	nd
Thallium	mg/kg	0.1	nd	0.1	0.1	0.1
Uranium	mg/kg	0.1	0.1	0.3	0.4	0.2

Legend:

EQL = Estimated Quantitation Limit for routine analysis

nd = not detected above standard EQL

nd() = not detected at the elevated EQL specified due to matrix interferences or sample pre-dilution

- = Parameter not requested in Sample

Note : Soil results are expressed as air dry weight basis.
Biota results are expressed on a wet weight basis unless otherwise stated.

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Inorganic Parameters

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s.19(1)

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200 Bluewater Road
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Tel (902) 420-0203
Toll free (800) 565-7227
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Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0113573H
Client Project Number : NBF 13300-7

FAX # : 468-9009
Printed : 2001/10/05
Reported : 2001/10/05

Matrix	Soil	Soil	Soil	Soil
Philip ID	01-H061369	01-H061370	01-H061371	01-H061372
Client ID	SS-23A	SS-1A	SS-2A	SS-3A
Date Sampled (y/m/d)				
Date Received (y/m/d)	01/09/27	01/09/27	01/09/27	01/09/27

Analyte	Units	EQL	(Continued from previous page)			
Vanadium	mg/kg	2.	3.	14.	15.	12.
Zinc	mg/kg	2.	11.	3500	11000	81.
Mercury	mg/kg	0.01	nd	5.6	120	0.12

Legend:

EQL = Estimated Quantitation Limit for routine analysis
nd = not detected above standard EQL
nd() = not detected at the elevated EQL specified due to matrix interferences or sample pre-dilution
- = Parameter not requested in Sample
Note : Soil results are expressed as air dry weight basis.
Biota results are expressed on a wet weight basis unless otherwise stated.

page verified

Inorganic Parameters

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PSC Analytical Services
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Tel (902) 420-0203
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Fax (902) 420-8612

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0113573H
Client Project Number : NBF 13300-7

FAX # : 468-9009
Printed : 2001/10/05
Reported : 2001/10/05

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Matrix			Soil	Soil	Soil	Soil
Philip ID			01-H061373	01-H061374	01-H061375	01-H061376
Client ID			SS-4A	SS-4A DUP	DUP 30A	DUP 20A
Date Sampled (y/m/d)						
Date Received (y/m/d)			01/09/27	01/09/27	01/09/27	01/09/27
Analyte	Units	EQL	DUP			
HNO3 Peroxide Digestion	-	-	20011002-B	20011002-B	20011002-B	20011002-B
Mercury Digestion	-	-	20011003-A	20011003-A	20011002-D	20011003-A
Aluminum	mg/kg	10	4900	5600	6000	1400
Antimony	mg/kg	2.	nd	nd	nd	nd
Antimony Recovery	%	-	40.	40.	40.	40.
Arsenic	mg/kg	2.	nd	nd	nd	nd
Barium	mg/kg	5.	75.	67.	65.	nd
Beryllium	mg/kg	5.	nd	nd	nd	nd
Boron	mg/kg	5.	nd	nd	nd	nd
Cadmium	mg/kg	0.3	0.3	0.4	0.3	nd
Chromium	mg/kg	2.	5.	6.	7.	3.
Cobalt	mg/kg	1.	3.	3.	3.	1.
Copper	mg/kg	2.	5.	5.	4.	nd
Iron	mg/kg	20	4900	5600	5700	2600
Iron Recovery	%	-	90.	90.	90.	90.
Lead	mg/kg	0.5	870	900	730	1.3
Manganese	mg/kg	2.	640	720	580	37.
Molybdenum	mg/kg	2.	nd	nd	nd	nd
Nickel	mg/kg	2.	5.	6.	7.	3.
Selenium	mg/kg	2.	nd	nd	nd	nd
Silver	mg/kg	0.5	nd	nd	nd	nd
Strontium	mg/kg	5.	nd	nd	nd	nd
Thallium	mg/kg	0.1	nd	0.1	0.1	nd
Uranium	mg/kg	0.1	0.2	0.2	0.2	0.1

Legend:

EQL = Estimated Quantitation Limit for routine analysis
nd = not detected above standard EQL
nd() = not detected at the elevated EQL specified due to matrix interferences or sample pre-dilution
- = Parameter not requested in Sample

Note : Soil results are expressed as air dry weight basis.
Biota results are expressed on a wet weight basis unless otherwise stated.

page verified

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Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0113573H
Client Project Number : NBF 13300-7

FAX # : 468-9009
Printed : 2001/10/05
Reported : 2001/10/05

Matrix	Soil	Soil	Soil	Soil
Philip ID	01-H061373	01-H061374	01-H061375	01-H061376
Client ID	SS-4A	SS-4A DUP	DUP 30A	DUP 20A
Date Sampled (y/m/d)				
Date Received (y/m/d)	01/09/27	01/09/27	01/09/27	01/09/27

Analyte Units EQL (Continued from previous page)

Vanadium	mg/kg	2.	8.	9.	9.	3.
Zinc	mg/kg	2.	740	880	2500	16.
Mercury	mg/kg	0.01	0.28	0.33	0.73	nd

Legend:

EQL = Estimated Quantitation Limit for routine analysis
nd = not detected above standard EQL
nd() = not detected at the elevated EQL specified due to matrix interferences or sample pre-dilution
- = Parameter not requested in Sample
Note : Soil results are expressed as air dry weight basis.
Biota results are expressed on a wet weight basis unless otherwise stated.

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NS B3B 1W8
PSC Project Number : 0113573H
Client Project Number : NBF 13300-7

FAX # : 468-9009
Printed : 2001/10/05
Reported : 2001/10/05

Matrix			Soil	Soil	Soil	Soil
Philip ID			01-H061377	01-H061378	01-H061379	01-H061380
Client ID			SS-7	SS-80A	SS-6A	SS-100A
Date Sampled (y/m/d)						
Date Received (y/m/d)			01/09/27	01/09/27	01/09/27	01/09/27
Analyte	Units	EQL				
HNO3 Peroxide Digestion	-		20011002-B	20011002-B	20011002-B	20011003-A
Mercury Digestion	-		20011003-A	20011003-A	20011003-A	20011003-A
Aluminum	mg/kg	10	9400	2500	3000	1000
Antimony	mg/kg	2.	nd	nd	nd	nd
Antimony Recovery	%	-	40.	40.	40.	30.
Arsenic	mg/kg	2.	2.	nd	5.	nd
Barium	mg/kg	5.	43.	130	47.	nd
Beryllium	mg/kg	5.	nd	nd	nd	nd
Boron	mg/kg	5.	nd	nd	nd	nd
Cadmium	mg/kg	0.3	0.6	0.3	0.4	nd
Chromium	mg/kg	2.	8.	5.	4.	2.
Cobalt	mg/kg	1.	4.	2.	1.	1.
Copper	mg/kg	2.	5.	3.	5.	nd
Iron	mg/kg	20	8700	2900	3400	2000
Iron Recovery	%	-	90.	90.	90.	85.
Lead	mg/kg	0.5	450	670	290	4.5
Manganese	mg/kg	2.	1000	240	230	29.
Molybdenum	mg/kg	2.	nd	nd	nd	nd
Nickel	mg/kg	2.	8.	3.	3.	2.
Selenium	mg/kg	2.	nd	nd	nd	nd
Silver	mg/kg	0.5	nd	nd	nd	nd
Strontium	mg/kg	5.	nd	39.	29.	nd
Thallium	mg/kg	0.1	0.1	nd	0.1	nd
Uranium	mg/kg	0.1	0.3	0.1	0.3	0.1

Legend:

EQL = Estimated Quantitation Limit for routine analysis
nd = not detected above standard EQL
nd() = not detected at the elevated EQL specified due to matrix interferences or sample pre-dilution
- = Parameter not requested in Sample

Note : Soil results are expressed as air dry weight basis.
Biota results are expressed on a wet weight basis unless otherwise stated.

page verified

Inorganic Parameters

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PSC Analytical Services
200 Bluewater Road
Bedford, NS Canada B4B 1G9
Tel (902) 420-0203
Toll free (800) 565-7227
Fax (902) 420-8612

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0113573H
Client Project Number : NBF 13300-7

FAX # : 468-9009
Printed : 2001/10/05
Reported : 2001/10/05

Matrix	Soil	Soil	Soil	Soil
Philip ID	01-H061377	01-H061378	01-H061379	01-H061380
Client ID	SS-7	SS-80A	SS-6A	SS-100A
Date Sampled (y/m/d)	01/09/27	01/09/27	01/09/27	01/09/27
Date Received (y/m/d)	01/09/27	01/09/27	01/09/27	01/09/27

Analyte Units EQL (Continued from previous page)

Vanadium	mg/kg	2.	14.	5.	9.	2.
Zinc	mg/kg	2.	650	270	160	11.
Mercury	mg/kg	0.01	0.06	0.03	0.11	nd

Legend:

EQL = Estimated Quantitation Limit for routine analysis
nd = not detected above standard EQL
nd() = not detected at the elevated EQL specified due to matrix interferences or sample pre-dilution
- = Parameter not requested in Sample

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Biota results are expressed on a wet weight basis unless otherwise stated.

page verified

Inorganic Parameters

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Dartmouth
NS B3B 1W8
PSC Project Number : 0113573H
Client Project Number : NBF 13300-7

FAX # : 468-9009
Printed : 2001/10/05
Reported : 2001/10/05

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Matrix	Soil	Soil	Soil	Soil
Philip ID	01-H061381	01-H061382	01-H061383	01-H061384
Client ID	SS-101A	SS-102A	SS-103A	SS-104A
Date Sampled (y/m/d)				
Date Received (y/m/d)	01/09/27	01/09/27	01/09/27	01/09/27

Analyte	Units	EQL				
HNO3 Peroxide Digestion	-	-	20011003-A	20011003-A	20011003-A	20011003-A
Mercury Digestion	-	-	20011003-A	20011003-A	20011003-A	20011003-A
Aluminum	mg/kg	10	1100	1100	1100	1100
Antimony	mg/kg	2.	nd	nd	nd	nd
Antimony Recovery	%	-	30.	30.	30.	30.
Arsenic	mg/kg	2.	nd	nd	nd	nd
Barium	mg/kg	5.	nd	nd	nd	nd
Beryllium	mg/kg	5.	nd	nd	nd	nd
Boron	mg/kg	5.	nd	nd	nd	nd
Cadmium	mg/kg	0.3	nd	nd	nd	nd
Chromium	mg/kg	2.	2.	2.	2.	2.
Cobalt	mg/kg	1.	1.	1.	1.	1.
Copper	mg/kg	2.	nd	nd	nd	nd
Iron	mg/kg	20	2100	2000	2100	2100
Iron Recovery	%	-	85.	85.	85.	85.
Lead	mg/kg	0.5	4.3	2.7	2.9	2.9
Manganese	mg/kg	2.	33.	28.	31.	27.
Molybdenum	mg/kg	2.	nd	nd	nd	nd
Nickel	mg/kg	2.	2.	2.	2.	2.
Selenium	mg/kg	2.	nd	nd	nd	nd
Silver	mg/kg	0.5	nd	nd	nd	nd
Strontium	mg/kg	5.	nd	nd	nd	nd
Thallium	mg/kg	0.1	nd	nd	nd	nd
Uranium	mg/kg	0.1	0.1	0.1	0.1	0.1

Legend:

EQL = Estimated Quantitation Limit for routine analysis
nd = not detected above standard EQL
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Note : Soil results are expressed as air dry weight basis.
Biota results are expressed on a wet weight basis unless otherwise stated.

page verified

Inorganic Parameters

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s.19(1)

PSC Analytical Services
200 Bluewater Road
Bedford, NS Canada B4B 1G9
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Fax (902) 420-8612

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0113573H
Client Project Number : NBF 13300-7

FAX # : 468-9009
Printed : 2001/10/05
Reported : 2001/10/05

Matrix	Soil	Soil	Soil	Soil
Philip ID	01-H061381	01-H061382	01-H061383	01-H061384
Client ID	SS-101A	SS-102A	SS-103A	SS-104A
Date Sampled (y/m/d)				
Date Received (y/m/d)	01/09/27	01/09/27	01/09/27	01/09/27

Analyte Units EQL (Continued from previous page)

Vanadium	mg/kg	2.	2.	2.	2.	3.
Zinc	mg/kg	2.	13.	10.	12.	13.
Mercury	mg/kg	0.01	nd	nd	0.02	nd

Legend:

EQL = Estimated Quantitation Limit for routine analysis
nd = not detected above standard EQL
nd() = not detected at the elevated EQL specified due to matrix interferences or sample pre-dilution
- = Parameter not requested in Sample

Note : Soil results are expressed as air dry weight basis.
Biota results are expressed on a wet weight basis unless otherwise stated.

page verified

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Client : Jacques Whitford Environment Ltd.
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NS B3B 1W8
PSC Project Number : 0113573H
Client Project Number : NBF 13300-7

FAX # : 468-9009
Printed : 2001/10/05
Reported : 2001/10/05

Matrix	Soil	Soil
Philip ID	01-H061385	01-H061727
Client ID	SS-104A DU	BG80-A
	P	
Date Sampled (y/m/d)		
Date Received (y/m/d)	01/09/27	01/10/01

Analyte	Units	EQL	DUP	
HNO3 Peroxide Digestion		-	20011003-A	20011004-A
Mercury Digestion		-	20011003-A	20011003-A
Aluminum	mg/kg	10	1200	1400
Antimony	mg/kg	2.	nd	nd
Antimony Recovery	%	-	30.	50.
<hr/>				
Arsenic	mg/kg	2.	nd	nd
Barium	mg/kg	5.	nd	nd
Beryllium	mg/kg	5.	nd	nd
Boron	mg/kg	5.	nd	nd
Cadmium	mg/kg	0.3	nd	nd
<hr/>				
Chromium	mg/kg	2.	2.	2.
Cobalt	mg/kg	1.	1.	1.
Copper	mg/kg	2.	nd	nd
Iron	mg/kg	20	2300	2500
Iron Recovery	%	-	85.	90.
<hr/>				
Lead	mg/kg	0.5	3.1	0.9
Manganese	mg/kg	2.	28.	36.
Molybdenum	mg/kg	2.	nd	nd
Nickel	mg/kg	2.	2.	2.
Selenium	mg/kg	2.	nd	nd
<hr/>				
Silver	mg/kg	0.5	nd	nd
Strontium	mg/kg	5.	nd	nd
Thallium	mg/kg	0.1	nd	nd
Uranium	mg/kg	0.1	0.1	0.1

Legend:

EQL = Estimated Quantitation Limit for routine analysis
nd = not detected above standard EQL
nd() = not detected at the elevated EQL specified due to matrix interferences or sample pre-dilution
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page verified

Organic Parameters

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s.19(1)

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NS B3B 1W8
PSC Project Number : 0113573H
Client Project Number : NBF 13300-7

FAX # : 468-9009
Printed : 2001/10/05
Reported : 2001/10/05

Matrix	Soil	Soil
Philip ID	01-H061385	01-H061727
Client ID	SS-104A DU	BG80-A
	P	
Date Sampled (y/m/d)		
Date Received (y/m/d)	01/09/27	01/10/01

Analyte	Units	EQL	(Continued from previous page)
---------	-------	-----	----------------------------------

Vanadium	mg/kg	2.	3.	3.
Zinc	mg/kg	2.	16.	11.
Mercury	mg/kg	0.01	nd	0.05
01-H061385 SS-104A DUP		Antimony is 60 % recovery in the digested matrix spike.		

Legend:

EQL = Estimated Quantitation Limit for routine analysis
nd = not detected above standard EQL
nd() = not detected at the elevated EQL specified due to matrix interferences or sample pre-dilution
- = Parameter not requested in Sample
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page verified

Inorganic Parameters

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PSC Project Number : 0113573H
Client Project Number : NBF 13300-7

FAX # : 468-9009
Printed : 2001/10/05
Reported : 2001/10/05

s.19(1)

Certificate of Analysis

Method Summaries:

- Mercury in Soils and Sediments: Digestion/Cold Vapour Atomic Absorption.
Ref: USEPA Method #245.5
- Available Trace Metals in soils/sediments: Nitric/Peroxide Digestion.
Ref:USEPA Method #3050B.

General Project Comments

Boron is 55 % recovery in the digested reference material for sample batch 20011002-A and 20011002-B and 20011003-A.
Boron is 60% recovery in the digested reference material for sample batch 20011004-A.

All work recorded herein has been done in accordance with normal professional standards using accepted testing technologies, quality assurance and quality control procedures except where otherwise agreed to by the client and testing company in writing. Liability for any and all use of these test results shall be limited to the actual cost of the pertinent analysis performed. There is no other warranty expressed or implied. Excess sample will be discarded upon expiry of hold time.

Approval of Inorganic Parameters:

Inorganics Manager :



Organic Parameters

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s.19(1)

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth

NS B3B 1W8

PSC Project Number : 0113573H

Client Project Number : NBF 13300-7

FAX # : 468-9009

Printed : 2001/10/05

Reported : 2001/10/05

Matrix	Soil	Soil	Soil
Philip ID	01-H061358	01-H061378	01-H061384
Client ID	SS-61A	SS-80A	SS-104A

Date Sampled (y/m/d)			
Date Received (y/m/d)	01/09/27	01/09/27	01/09/27

Analyte	Units	EQL
---------	-------	-----

TEH C11-32 Soil Event #	-	EX20	EX20	EX21
VPH in Soil Event #	-	EX43	EX16	EX16
Benzene	mg/kg	0.025	nd	nd
Toluene	mg/kg	0.025	nd	nd
Ethylbenzene	mg/kg	0.025	nd	nd

Xylenes	mg/kg	0.050	nd	nd	nd
C6 - C10 HC {less BTEX}	mg/kg	2.5	nd	nd	nd
>C10-C21 (Fuel Range)	mg/kg	15.	nd	21.	nd
>C21-C32 (Lube Range)	mg/kg	15.	nd	71.	nd
Modified TPH - Tier 1	mg/kg	32.	nd	92.	nd

TEH Surrogate (IBB)	% Rec.	-	95.	93.	98.
TEH Surrogate (C32)	% Rec.	-	93.	98.	90.
VPH Surrogate (IBB)	% Rec.	-	83.	89.	92.
Moisture	%	-	< 5	14.	3.5

Note: The product resemblance comments are provided for general guidance only and may not be accurate. Resemblances are based on comparison with available reference standards. Due to chromatographic similarity of certain products, the influence of weathering effects and interference of non-petrogenic compounds, it is not always possible to positively identify products.

Notes: Modified TPH - Tier 1 (C6-C32) does not include BTEX
01-H061378 SS-80A Fuel/lube range.

Legend:

EQL = Estimated Quantitation Limit for routine analysis
nd = not detected above standard EQL
nd() = not detected at the elevated EQL shown in parentheses
- = Parameter not requested in Sample
Note : Soil results are expressed on a dry weight basis.
Biota results are expressed on a wet weight basis.
% Rec = Percent Recovery of added surrogate compound(s)
page verified



rganic Parameters

page

2

s.19(1)

PSC Analytical Services
200 Bluewater Road
Bedford, NS Canada B4B 1G9
Tel (902) 420-0203
Toll free (800) 565-7227
Fax (902) 420-8612

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0113573H
Client Project Number : NBF 13300-7

FAX # : 468-9009
Printed : 2001/10/05
Reported : 2001/10/05

Certificate of Analysis

Method Summaries :

- Purgeable Hydrocarbons - Soil: Methanol extr'n. Headspace/GC-PID-FID.
Varian Genesis/3400 or HP5890 GC. Ref: Atlantic PIRI Guidelines
for Laboratories, Draft 1.0, 1999.
- Extractable Hydrocarbons - Soil: Acetone/Hexane extraction. HP5890 GC/FID.
Ref: Atlantic PIRI Guidelines for Laboratories, Draft 1.0, 1999.
- Moisture Content: Heating at 103C. Gravimetric det'n - as received basis.
Ref: Ontario MOE Analytical Methods for Env. Samples, Vol.1, Method: ME

All work recorded herein has been done in accordance with normal professional standards using accepted testing technologies, quality assurance and quality control procedures except where otherwise agreed to by the client and testing company in writing. Liability for any and all use of these test results shall be limited to the actual cost of the pertinent analysis performed. There is no other warranty expressed or implied. Excess sample will be discarded upon expiry of hold time.

Approval of Organic Parameters:

Organics Manager : _____



s.19(1)

PSC Analytical Services Inc.

Quality Assurance Data for TPH by Headspace GC/PID/FID

Matrix: Headspace Soils

Date: October 5, 2001

Event Number: EX16

Compound	QCA Target mg/kg	QCA % Recovery	QCB Target mg/kg	QCB % Recovery	Method Blank mg/kg
Benzene	1.00	84	1.00	91	< 0.025
Toluene	1.00	85	1.00	92	< 0.025
Ethyl Benzene	1.00	83	1.00	89	< 0.025
Xylenes	3.00	87	3.00	90	< 0.05
Gasoline	66	98	66	100	< 2.5



Manager



s.19(1)

PSC Analytical Services Inc.

Quality Assurance Data for TEH by GC/FID

Matrix: Soil

Date: October 4, 2001

Event Number: EX20

<u>Compound</u>	<u>QCA Target mg/kg</u>	<u>QCA % Recovery</u>	<u>QCB Target mg/kg</u>	<u>QCB % Recovery</u>	<u>Method Blank mg/kg</u>
TEH (>C10-C32)	1000	92			< 30
TEH (>C10-C32)			1000	90	< 30



Analyst



Manager



s.19(1)

PSC Analytical Services Inc.

Quality Assurance Data for TEH by GC/FID

Matrix: Soil

Date: October 4, 2001

Event Number: EX21

Compound	QCA Target mg/kg	QCA % Recovery	QCB Target mg/kg	QCB % Recovery	Method Blank mg/kg
TEH (>C10-C32)	1000	91			< 30
TEH (>C10-C32)			1000	95	< 30



Analyst

Manager



s.19(1)

PSC Analytical Services Inc.

Quality Assurance Data for TPH by Headspace GC/PID/FID

Matrix: Headspace Soils

Date: October 5, 2001

Event Number: EX43

Compound	QCA Target mg/kg	QCA % Recovery	QCB Target mg/kg	QCB % Recovery	Method Blank mg/kg
Benzene	1.00	85	1.00	83	< 0.025
Toluene	1.00	86	1.00	84	< 0.025
Ethyl Benzene	1.00	85	1.00	84	< 0.025
Xylenes	3.00	83	3.00	83	< 0.05
Gasoline	66	118	66	117	< 2.5

A rectangular box with a grey grid pattern, intended for the Analyst's signature.

Analyst

A rectangular box with a grey grid pattern, intended for the Manager's signature.

Manager



ANALYTICAL SERVICES

Inorganic Parameters

page : 1

s.19(1)

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth

NS B3B 1W8

PSC Project Number : 0112933H

Client Project Number : NBF 13300-7-2

FAX # : 468-9009

Printed : 2001/09/27

Reported : 2001/09/27

Matrix	Paint	Paint	Paint	Paint
Philip ID	01-H057717	01-H057718	01-H057719	01-H057720
Client ID	PB2	PB1	PB3	PB4
Date Sampled (y/m/d)	01/09/12	01/09/12	01/09/12	01/09/12
Date Received (y/m/d)	01/09/18	01/09/18	01/09/18	01/09/18

Analyte	Units	EQL				
HNO3 Peroxide Digestion	-	-	20010921-A	20010921-A	20010921-A	20010921-A
Mercury Digestion	-	-	completed	completed	completed	completed
Aluminum	mg/kg	10	4700	4600	6300	4100
Antimony	mg/kg	2.	nd	nd	nd	nd
Antimony Recovery	%	-	40.	40.	40.	40.
Arsenic	mg/kg	2.	nd	nd	nd	nd
Barium	mg/kg	5.	7.	120	44.	54.
Beryllium	mg/kg	5.	nd	nd	nd	nd
Boron	mg/kg	5.	5.	16.	27.	5.
Cadmium	mg/kg	0.3	0.6	3.3	0.4	1.7
Chromium	mg/kg	2.	2.	3.	nd	4.
Cobalt	mg/kg	1.	260	150	220	240
Copper	mg/kg	2.	4.	5.	6.	4.
Iron	mg/kg	20	250	580	310	560
Iron Recovery	%	-	100	100	100	100
Lead	mg/kg	0.5	1300	1900	820	1300
Manganese	mg/kg	2.	100	92.	110	42.
Molybdenum	mg/kg	2.	nd	nd	nd	nd
Nickel	mg/kg	2.	nd	nd	nd	nd
Selenium	mg/kg	2.	nd	nd	nd	nd
Silver	mg/kg	0.5	nd	nd	nd	nd
Strontium	mg/kg	5.	11.	25.	33.	10.
Thallium	mg/kg	0.1	nd	nd	0.1	nd
Uranium	mg/kg	0.1	0.1	0.2	0.2	0.1

Legend:

EQL = Estimated Quantitation Limit for routine analysis
nd = not detected above standard EQL
nd() = not detected at the elevated EQL specified due to matrix interferences or sample pre-dilution
- = Parameter not requested in Sample

Note : Soil results are expressed as air dry weight basis.
Biota results are expressed on a wet weight basis unless otherwise stated.

page verified



Inorganic Parameters

page : 2

s.19(1)

PSC Analytical Services
200 Bluewater Road
Bedford, NS Canada B4B 1G9
Tel (902) 420-0203
Toll free (800) 565-7227
Fax (902) 420-8612

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0112933H
Client Project Number : NBF 13300-7-2

FAX # : 468-9009
Printed : 2001/09/27
Reported : 2001/09/27

Matrix	Paint	Paint	Paint	Paint
Philip ID	01-H057717	01-H057718	01-H057719	01-H057720
Client ID	PB2	PB1	PB3	PB4
Date Sampled (y/m/d)	01/09/12	01/09/12	01/09/12	01/09/12
Date Received (y/m/d)	01/09/18	01/09/18	01/09/18	01/09/18

Analyte Units EQL (Continued from previous page)

Vanadium	mg/kg	2.	nd	3.	2.	3.
Zinc	mg/kg	2.	310	5300	190	1500
Mercury	mg/kg	0.01	5.4	41.	42.	16.
Weight	g	0.02	1.49	2.44	1.17	3.10
01-H057717 PB2		Boron is 58 % recovery in the digested reference material for sample batch 20010921-A.				

Legend:

EQL = Estimated Quantitation Limit for routine analysis
nd = not detected above standard EQL
nd() = not detected at the elevated EQL specified due to matrix interferences or sample pre-dilution
- = Parameter not requested in Sample
Note : Soil results are expressed as air dry weight basis.
Biota results are expressed on a wet weight basis unless otherwise stated.

page verified

PSC Analytical Services
200 Bluewater Road
Bedford, NS Canada B4B 1G9
Tel (902) 420-0203
Toll free (800) 565-7227
Fax (902) 420-8612

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0112933H
Client Project Number : NBF 13300-7-2

FAX # : 468-9009
Printed : 2001/09/27
Reported : 2001/09/27

Matrix			Paint	Paint	Paint	Paint
Philip ID			01-H057721	01-H057722	01-H057723	01-H057724
Client ID			PB5	PB6	PB8	PB9
Date Sampled (y/m/d)			01/09/12	01/09/12	01/09/12	01/09/12
Date Received (y/m/d)			01/09/18	01/09/18	01/09/18	01/09/18

Analyte	Units	EQL				
HNO3 Peroxide Digestion	-	-	20010921-A	20010921-A	20010921-A	20010921-A
Mercury Digestion	-	-	completed	completed	completed	completed
Aluminum	mg/kg	10	6500	630	2400	7300
Antimony	mg/kg	2.	nd	71.	11.	nd
Antimony Recovery	%	-	40.	40.	40.	40.

Arsenic	mg/kg	2.	nd	2.	nd	nd
Barium	mg/kg	5.	13.	30.	1500	31.
Beryllium	mg/kg	5.	nd	nd	nd	nd
Boron	mg/kg	5.	nd	nd	34.	14.
Cadmium	mg/kg	0.3	0.4	0.4	0.3	0.3

Chromium	mg/kg	2.	8.	560	430	2.
Cobalt	mg/kg	1.	93.	79.	280	60.
Copper	mg/kg	2.	4.	12.	2000	23.
Iron	mg/kg	20	460	2200	980	300
Iron Recovery	%	-	100	100	100	100

Lead	mg/kg	0.5	28000	3600	16000	52000
Manganese	mg/kg	2.	16.	20.	98.	93.
Molybdenum	mg/kg	2.	nd	120	34.	nd
Nickel	mg/kg	2.	nd	nd	9.	nd
Selenium	mg/kg	2.	nd	nd	nd	nd

Silver	mg/kg	0.5	nd	nd	nd	nd
Strontium	mg/kg	5.	26.	72.	30.	24.
Thallium	mg/kg	0.1	0.2	nd	0.3	1.2
Uranium	mg/kg	0.1	0.1	0.1	0.1	0.1

Legend:

EQL = Estimated Quantitation Limit for routine analysis
nd = not detected above standard EQL
nd() = not detected at the elevated EQL specified due to matrix interferences or sample pre-dilution
- = Parameter not requested in Sample

Note : Soil results are expressed as air dry weight basis.
Biota results are expressed on a wet weight basis unless otherwise stated.

page verified

Organic Parameters

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s.19(1)

PSC Analytical Services
200 Bluewater Road
Bedford, NS Canada B4B 1G9
Tel (902) 420-0203
Toll free (800) 565-7227
Fax (902) 420-8612

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0112933H
Client Project Number : NBF 13300-7-2

FAX # : 468-9009
Printed : 2001/09/27
Reported : 2001/09/27

Matrix	Paint	Paint	Paint	Paint
Philip ID	01-H057721	01-H057722	01-H057723	01-H057724
Client ID	PB5	PB6	PB8	PB9
Date Sampled (y/m/d)	01/09/12	01/09/12	01/09/12	01/09/12
Date Received (y/m/d)	01/09/18	01/09/18	01/09/18	01/09/18

Analyte Units EQL (Continued from previous page)

Analyte	Units	EQL				
Vanadium	mg/kg	2.	4.	2.	6.	2.
Zinc	mg/kg	2.	730	860	12000	53000
Mercury	mg/kg	0.01	9.7	0.18	5.7	18.
Weight	g	0.02	3.33	7.20	4.63	6.88

Legend:

EQL = Estimated Quantitation Limit for routine analysis
nd = not detected above standard EQL
nd() = not detected at the elevated EQL specified due to matrix interferences or sample pre-dilution
- = Parameter not requested in Sample

Note : Soil results are expressed as air dry weight basis.
Biota results are expressed on a wet weight basis unless otherwise stated.

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Inorganic Parameters

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s.19(1)

PSC Analytical Services
200 Bluewater Road
Bedford, NS Canada B4B 1G9
Tel (902) 420-0203
Toll free (800) 565-7227
Fax (902) 420-8612

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0112933H
Client Project Number : NBF 13300-7-2

FAX # : 468-9009
Printed : 2001/09/27
Reported : 2001/09/27

Matrix	Paint	Paint	Paint	Paint
Philip ID	01-H057725	01-H057726	01-H057727	01-H057728
Client ID	PB10	PB11	PB12	PB13
Date Sampled (y/m/d)	01/09/12	01/09/12	01/09/12	01/09/12
Date Received (y/m/d)	01/09/18	01/09/18	01/09/18	01/09/18

Analyte	Units	EQL				
HNO3 Peroxide Digestion	-	-	20010921-A	20010921-A	20010921-A	20010921-A
Mercury Digestion	-	-	completed	completed	completed	completed
Aluminum	mg/kg	10	540	110	6200	6400
Antimony	mg/kg	2.	nd	nd	nd	nd
Antimony Recovery	%	-	40.	40.	40.	40.
Arsenic	mg/kg	2.	22.	17.	nd	2.
Barium	mg/kg	5.	1300	nd	31.	40.
Beryllium	mg/kg	5.	nd	nd	nd	nd
Boron	mg/kg	5.	47.	nd	14.	14.
Cadmium	mg/kg	0.3	2.0	13.	0.7	1.3
Chromium	mg/kg	2.	11000	1900	4.	35.
Cobalt	mg/kg	1.	280	38.	82.	100
Copper	mg/kg	2.	360	170	38.	11.
Iron	mg/kg	20	150000	360000	1500	930
Iron Recovery	%	-	100	100	100	100
Lead	mg/kg	0.5	55000	8000	48000	1100
Manganese	mg/kg	2.	640	1400	92.	98.
Molybdenum	mg/kg	2.	7.	7.	nd	nd
Nickel	mg/kg	2.	100	100	nd	7.
Selenium	mg/kg	2.	nd	nd	nd	nd
Silver	mg/kg	0.5	0.5	nd	nd	nd
Strontium	mg/kg	5.	38.	8.	25.	32.
Thallium	mg/kg	0.1	1.0	0.1	1.0	0.1
Uranium	mg/kg	0.1	0.1	nd	0.1	0.2

Legend:

EQL = Estimated Quantitation Limit for routine analysis
nd = not detected above standard EQL
nd() = not detected at the elevated EQL specified due to matrix interferences or sample pre-dilution
- = Parameter not requested in Sample

Note : Soil results are expressed as air dry weight basis.
Biota results are expressed on a wet weight basis unless otherwise stated.

page verified

Inorganic Parameters

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s.19(1)

PSC Analytical Services
200 Bluewater Road
Bedford, NS Canada B4B 1G9
Tel (902) 420-0203
Toll free (800) 565-7227
Fax (902) 420-8612

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0112933H
Client Project Number : NBF 13300-7-2

FAX # : 468-9009
Printed : 2001/09/27
Reported : 2001/09/27

Matrix	Paint	Paint	Paint	Paint
Philip ID	01-H057725	01-H057726	01-H057727	01-H057728
Client ID	PB10	PB11	PB12	PB13
Date Sampled (y/m/d)	01/09/12	01/09/12	01/09/12	01/09/12
Date Received (y/m/d)	01/09/18	01/09/18	01/09/18	01/09/18

Analyte	Units	EQL	(Continued from previous page)			
Vanadium	mg/kg	2.	13.	2.	2.	3.
Zinc	mg/kg	2.	17000	2100	46000	400
Mercury	mg/kg	0.01	0.15	nd	19.	26.
Weight	g	0.02	11.6	118.	11.2	2.36

Legend:

EQL = Estimated Quantitation Limit for routine analysis
nd = not detected above standard EQL
nd() = not detected at the elevated EQL specified due to matrix interferences or sample pre-dilution
- = Parameter not requested in Sample
Note : Soil results are expressed as air dry weight basis.
Biota results are expressed on a wet weight basis unless otherwise stated.

page verified

Inorganic Parameters

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s.19(1)

PSC Analytical Services
200 Bluewater Road
Bedford, NS Canada B4B 1G9
Tel (902) 420-0203
Toll free (800) 565-7227
Fax (902) 420-8612

Client : Jacques Whitford Environment Ltd
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0112933H
Client Project Number : NBF 13300-7-2

FAX # : 468-9009
Printed : 2001/09/27
Reported : 2001/09/27

Certificate of Analysis

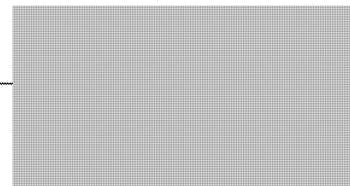
Method Summaries:

- Mercury in Soils and Sediments: Digestion/Cold Vapour Atomic Absorption.
Ref: USEPA Method #245.5
- Available Trace Metals in soils/sediments: Nitric/Peroxide Digestion.
Ref:USEPA Method #3050B.

All work recorded herein has been done in accordance with normal professional standards using accepted testing technologies, quality assurance and quality control procedures except where otherwise agreed to by the client and testing company in writing. Liability for any and all use of these test results shall be limited to the actual cost of the pertinent analysis performed. There is no other warranty expressed or implied. Excess sample will be discarded upon expiry of hold time.

Approval of Inorganic Parameters:

Inorganics Manager : _____





ANALYTICAL SERVICES

Organic Parameters

page : 1

s.19(1)

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth

NS B3B 1W8

PSC Project Number : 0113648H
Client Project Number : NBF13300-7-2

FAX # : 468-9009
Printed : 2001/10/09
Reported : 2001/10/09

Matrix : Soil
Philip ID : 01-H061841
Client ID : SS4A

Date Sampled (y/m/d)
Date Received (y/m/d) : 01/10/02

Analyte	Units	EQL
TEH C11-32 Soil Event #	-	EX51
VPH in Soil Event #	-	EX26
Benzene	mg/kg	0.025 nd
Toluene	mg/kg	0.025 nd
Ethylbenzene	mg/kg	0.025 nd
Xylenes	mg/kg	0.050 nd
C6 - C10 HC {less BTEX}	mg/kg	2.5 nd
>C10-C21 (Fuel Range)	mg/kg	15. nd
>C21-C32 (Lube Range)	mg/kg	15. 23.
Modified TPH - Tier 1	mg/kg	32. nd
TEH Surrogate (IBB)	% Rec.	- 101.
TEH Surrogate (C32)	% Rec.	- 89.
VPH Surrogate (IBB)	% Rec.	- 103.
Moisture	%	- 8.4

Note: The product resemblance comments are provided for general guidance only and may not be accurate. Resemblances are based on comparison with available reference standards. Due to chromatographic similarity of certain products, the influence of weathering effects and interference of non-petrogenic compounds, it is not always possible to positively identify products.

Notes: Modified TPH - Tier 1 (C6-C32) does not include BTEX
01-H061841 SS4A Lube range.

Legend:

EQL = Estimated Quantitation Limit for routine analysis
nd = not detected above standard EQL
nd() = not detected at the elevated EQL shown in parentheses
- = Parameter not requested in Sample

Note : Soil results are expressed on a dry weight basis.
Biota results are expressed on a wet weight basis.
% Rec = Percent Recovery of added surrogate compound(s)

page verified



Organic Parameters

page . 2

PSC Analytical Services
200 Bluewater Road
Bedford, NS Canada B4B 1G9
Tel (902) 420-0203
Toll free (800) 565-7227
Fax (902) 420-8612

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0113648H
Client Project Number : NBF13300-7-2

FAX # : 468-9009
Printed : 2001/10/09
Reported : 2001/10/09

s.19(1)

Certificate of Analysis

Method Summaries :

- Purgeable Hydrocarbons - Soil: Methanol extr'n. Headspace/GC-PID-FID.
Varian Genesis/3400 or HP5890 GC. Ref: Atlantic PIRI Guidelines for Laboratories, Draft 1.0, 1999.
- Extractable Hydrocarbons - Soil: Acetone/Hexane extraction. HP5890 GC/FID.
Ref: Atlantic PIRI Guidelines for Laboratories, Draft 1.0, 1999.
- Moisture Content: Heating at 103C. Gravimetric det'n - as received basis.
Ref: Ontario MOE Analytical Methods for Env. Samples, Vol.1, Method: ME

All work recorded herein has been done in accordance with normal professional standards using accepted testing technologies, quality assurance and quality control procedures except where otherwise agreed to by the client and testing company in writing. Liability for any and all use of these test results shall be limited to the actual cost of the pertinent analysis performed. There is no other warranty expressed or implied. Excess sample will be discarded upon expiry of hold time.

Approval of Organic Parameters:

Organics Manager : _____



s.19(1)

PSC Analytical Services Inc.

Quality Assurance Data for TPH by Headspace GC/PID/FID


Matrix: Headspace Soils

Date: October 4, 2001

Event Number: EX26

Compound	QCA Target mg/kg	QCA % Recovery	QCB Target mg/kg	QCB % Recovery	Method Blank mg/kg
Benzene	1.00	85	1.00	74	< 0.025
Toluene	1.00	88	1.00	78	< 0.025
Ethyl Benzene	1.00	84	1.00	74	< 0.025
Xylenes	3.00	83	3.00	73	< 0.05
Gasoline	66	73	66	62	< 2.5


Analyst


Manager



s.19(1)

PSC Analytical Services Inc.

Quality Assurance Data for TEH by GC/FID

Matrix: Soil

Date: October 8, 2001

Event Number: EX51

Compound	QCA Target mg/kg	QCA % Recovery	QCB Target mg/kg	QCB % Recovery	Method Blank mg/kg
TEH (>C10-C32)	1000	95			< 30
TEH (>C10-C32)			1000	93	< 30



Analyst



Manager



ANALYTICAL SERVICES

Inorganic Parameters

page . 1

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth

NS B3B 1W8

PSC Project Number : 0113701H

Client Project Number : NBF 13300-7-2

FAX # : 468-9009

Printed : 2001/10/12

Reported : 2001/10/12

s.19(1)

Matrix	Leachate	Leachate
Philip ID	01-H062037	01-H062038
Client ID	PB 9	PB 10
Date Sampled (y/m/d)		
Date Received (y/m/d)	01/10/02	01/10/02

Analyte	Units	EQL		
CGSB Leachate	-	complete	complete	
Total Water Digest	-	20011005-C	20011005-C	
Initial pH	Units	1.0	5.8	5.4
Final pH	Units	1.0	5.0	4.9
0.5N Acetic acid volume	mL/L	0.0	1.6	0.6
Aluminum	ug/L	100	140	nd
Antimony	ug/L	20.	nd	nd
Arsenic	ug/L	20.	nd	nd
Barium	ug/L	50.	nd	310
Beryllium	ug/L	50.	nd	nd
Boron	ug/L	50.	nd	78.
Cadmium	ug/L	3.0	nd	nd
Chromium	ug/L	20.	nd	420
Cobalt	ug/L	10.	nd	48.
Copper	ug/L	20.	340	nd
Iron	ug/L	200	nd	nd
Lead	ug/L	5.0	4600	140
Manganese	ug/L	20.	32.	250
Molybdenum	ug/L	20.	nd	nd
Nickel	ug/L	20.	nd	nd
Selenium	ug/L	20.	nd	nd
Silver	ug/L	5.0	nd	nd
Strontium	ug/L	50.	nd	nd
Thallium	ug/L	1.0	nd	nd

Legend:

EQL = Estimated Quantitation Limit for routine analysis

nd = not detected above standard EQL

nd() = not detected at the elevated EQL specified due to matrix interferences or sample pre-dilution

- = Parameter not requested in Sample

Note : Soil results are expressed as air dry weight basis.

Biota results are expressed on a wet weight basis unless otherwise stated.

page verified



PSC Analytical Services
200 Bluewater Road
Bedford, NS Canada B4B 1G9
Tel (902) 420-0203
Toll free (800) 565-7227
Fax (902) 420-8612

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0113701H
Client Project Number : NBF 13300-7-2

FAX # : 468-9009
Printed : 2001/10/12
Reported : 2001/10/12

Matrix	Leachate	Leachate
Philip ID	01-H062037	01-H062038
Client ID	PB 9	PB 10
Date Sampled (y/m/d)		
Date Received (y/m/d)	01/10/02	01/10/02

Analyte Units EQL (Continued from previous page)

Tin	ug/L	20.	nd	nd
Uranium	ug/L	1.0	nd	nd
Vanadium	ug/L	20.	nd	nd
Zinc	ug/L	20.	18000	4700
Moisture	%	0.10	nd(5.)	nd(5.)

Legend:

EQL = Estimated Quantitation Limit for routine analysis
nd = not detected above standard EQL
nd() = not detected at the elevated EQL specified due to matrix interferences or sample pre-dilution
- = Parameter not requested in Sample

Note : Soil results are expressed as air dry weight basis.
Biota results are expressed on a wet weight basis unless otherwise stated.

page verified

PSC Analytical Services
200 Bluewater Road
Bedford, NS Canada B4B 1G9
Tel (902) 420-0203
Toll free (800) 565-7227
Fax (902) 420-8612

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0113701H
Client Project Number : NBF 13300-7-2

FAX # : 468-9009
Printed : 2001/10/12
Reported : 2001/10/12

Certificate of Analysis

Method Summaries:

- Total Recoverable Metals Digest: Homogenization/Digestion. Ref: USEPA Method #200.2
- Leachate Extraction: pH 5 Acetic Acid Extraction. Ref: MOEE 347/CGSB 164-GP-IMP
- Trace Metals in Aqueous Samples: Elan 5000 ICP-MS. Ref: USEPA Method #200.8
- Total Metals in Leachate: Digestion/ICP-MS, Ref: USEPA 200.8

Conversions: 1 mg/L = 1000 ug/L = 1 part per million (ppm)
1 ug/L = 0.001 mg/L = 1 part per billion (ppb)

All work recorded herein has been done in accordance with normal professional standards using accepted testing technologies, quality assurance and quality control procedures except where otherwise agreed to by the client and testing company in writing. Liability for any and all use of these test results shall be limited to the actual cost of the pertinent analysis performed. There is no other warranty expressed or implied. Excess sample will be discarded upon expiry of hold time.

Approval of Inorganic Parameters:

Inorganics Manager : _____



ANALYTICAL SERVICES

Industrial Chemistry Parameters

page : 1

s.19(1)

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth

NS B3B 1W8

PSC Project Number : 0112933H
Client Project Number : NBF 13300-7-2

FAX # : 468-9009
Printed : 2001/09/27
Reported : 2001/09/27

Matrix	Paint	Paint	Paint	Paint
Philip ID	01-H057717	01-H057718	01-H057719	01-H057720
Description				
Client ID	PB2	PB1	PB3	PB4
Date Sampled (y/m/d)	01/09/12	01/09/12	01/09/12	01/09/12
Date Received (y/m/d)	01/09/18	01/09/18	01/09/18	01/09/18

Analyte	Units	EQL				
Weight	g	0.02	1.49	2.44	1.17	3.10

Legend:

EQL = Estimated Quantitation Limit for routine analysis
nd = not detected above standard EQL
nd() = not detected at the elevated EQL specified due to matrix interferences or sample pre-dilution
- = Parameter not requested in Sample

page verified



PSC Analytical Services
200 Bluewater Road
Bedford, NS Canada B4B 1G9
Tel (902) 420-0203
Toll free (800) 565-7227
Fax (902) 420-8612

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0112933H
Client Project Number : NBF 13300-7-2

FAX # : 468-9009
Printed : 2001/09/27
Reported : 2001/09/27

Matrix	Paint	Paint	Paint	Paint
Philip ID	01-H057721	01-H057722	01-H057723	01-H057724
Description				
Client ID	PB5	PB6	PB8	PB9
Date Sampled (y/m/d)	01/09/12	01/09/12	01/09/12	01/09/12
Date Received (y/m/d)	01/09/18	01/09/18	01/09/18	01/09/18
Analyte	Units	EQL		
Weight	g	0.02	3.33	7.20
			4.63	6.88

Legend:

EQL = Estimated Quantitation Limit for routine analysis
nd = not detected above standard EQL
nd() = not detected at the elevated EQL specified due to matrix interferences or sample pre-dilution
- = Parameter not requested in Sample

page verified

Industrial Chemistry Parameters

page : 3

s.19(1)

PSC Analytical Services
200 Bluewater Road
Bedford, NS Canada B4B 1G9
Tel (902) 420-0203
Toll free (800) 565-7227
Fax (902) 420-8612

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0112933H
Client Project Number : NBF 13300-7-2

FAX # : 468-9009
Printed : 2001/09/27
Reported : 2001/09/27

Matrix	Paint	Paint	Paint	Paint
Philip ID	01-H057725	01-H057726	01-H057727	01-H057728
Description				
Client ID	PB10	PB11	PB12	PB13
Date Sampled (y/m/d)	01/09/12	01/09/12	01/09/12	01/09/12
Date Received (y/m/d)	01/09/18	01/09/18	01/09/18	01/09/18

Analyte	Units	EQL				
Weight	g	0.02	11.6	118.	11.2	2.36

Legend:

EQL = Estimated Quantitation Limit for routine analysis
nd = not detected above standard EQL
nd() = not detected at the elevated EQL specified due to matrix interferences or sample pre-dilution
- = Parameter not requested in Sample

page verified

PSC Analytical Services
200 Bluewater Road
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Tel (902) 420-0203
Toll free (800) 565-7227
Fax (902) 420-8612

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0112933H
Client Project Number : NBF 13300-7-2

FAX # : 468-9009
Printed : 2001/09/27
Reported : 2001/09/27

Matrix	Other	Other
Philip ID	01-H057729	01-H057730
Description		
Client ID	PB14 & ASB	ASB2
	3	
Date Sampled (y/m/d)	01/09/12	01/09/12
Date Received (y/m/d)	01/09/18	01/09/18

Analyte	Units	EQL		
Asbestos	% (w)	1.	Present	Present
Chrysotile	% (w)	1.	20-40	20-40
Amosite	% (w)	1.	nd	nd
Crocidolite	% (w)	1.	nd	nd
Cellulose	% (w)	1.	nd	nd

Glass Fibres	% (w)	1.	nd	nd
Hair	% (w)	1.	nd	nd
Other	% (w)	1.	nd	nd
Mineral Wool	% (w)	1.	nd	nd

01-H057729 PB14 & ASB3

The sample was found to have a high concentration of asbestos, so lead analysis of the paint layer was not undertaken.

Legend:

EQL = Estimated Quantitation Limit for routine analysis
nd = not detected above standard EQL
nd() = not detected at the elevated EQL specified due to matrix interferences or sample pre-dilution
- = Parameter not requested in Sample

page verified

PSC Analytical Services
200 Bluewater Road
Bedford, NS Canada B4B 1G9
Tel (902) 420-0203
Toll free (800) 565-7227
Fax (902) 420-8612

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0112933H
Client Project Number : NBF 13300-7-2

FAX # : 468-9009
Printed : 2001/09/27
Reported : 2001/09/27

Certificate of Analysis

Method Summaries:

All work recorded herein has been done in accordance with normal professional standards using accepted testing technologies, quality assurance and quality control procedures except where otherwise agreed to by the client and testing company in writing. Liability for any and all use of these test results shall be limited to the actual cost of the pertinent analysis performed. There is no other warranty expressed or implied. Excess sample will be discarded upon expiry of hold time.

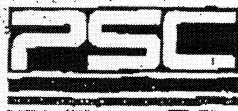
Approval of Industrial Chemistry Parameters:
Industrial Chemistry Manager

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11/22/2001 16:30 FAX 902 420 8612

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ANALYTICAL SERVICES

Inorganic Parameters

page : 1

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8

s.19(1)

PSC Project Number : 0116158X
Client Project Number : NBF 13300-7

FAX # : 468-9009
Printed : 2001/11/22
Reported : 2001/11/22

Matrix	Soil	Soil	Leachate	Soil
Philip ID	01-H074581	01-H074582	01-H074583	01-H074584
Client ID	SS1B	SS1C	SS2A	SS2B
Date Sampled (y/m/d)				
Date Received (y/m/d)	01/11/13	01/11/13	01/11/13	01/11/13

Analyte	Units	EQL			
MOBE 347 Leachate	-	-	-	complete	-
HNO3 Peroxide Digestion	-	20011119-A	20011119-A	-	20011119-A
Mercury Digestion	-	-	-	-	20011120-D
Dry Weight Used	g	0.01	-	41.6	-
Initial pH	Units	1.0	-	8.4	-
Final pH	Units	1.0	-	4.9	-
0.5N Acetic acid volume	mL/L	0.0	-	168.	-
Mercury	ug/L	0.05	-	45.	-
Zinc	mg/kg	2.	1300	5000	5500
Mercury	mg/kg	0.01	-	-	35.
Moisture	%	0.10	-	17.	-

Non-Conformance Comment: Leachate analysis performed using dry equivalent weight of less than 50g due to insufficient sample. All mass:volume ratios adjusted accordingly, but accuracy and precision of analytical data is reduced.

Legend:

EQL = Estimated Quantitation Limit for routine analysis
nd = not detected above standard EQL
nd() = not detected at the elevated EQL specified due to matrix interferences or sample pre-dilution
- = Parameter not requested in Sample

Note : Soil results are expressed as air dry weight basis.
Biota results are expressed on a wet weight basis unless otherwise stated.

page verified

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PSC ANALYTICAL SERVICES

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Inorganic Parameters page : 2

PSC Analytical Services
200 Bluewater Road
Bedford, NS Canada B4B 1G9
Tel (902) 420-0203
Toll free (800) 565-7227
Fax (902) 420-8612

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0116158H
Client Project Number : NBP 13300-7

FAX # : 468-9009
Printed : 2001/11/22
Reported : 2001/11/22

s.19(1)

Matrix			Soil	Leachate	Soil	Soil
Philip ID			01-H074585	01-H074586	01-H074587	01-H074588
Client ID			SS2C	SS4A	SS4B	SS4C
Date Sampled (y/m/d)						
Date Received (y/m/d)			01/11/13	01/11/13	01/11/13	01/11/13
Analyte	Units	EQL				
CGSB Leachate	-	-	-	complete	-	-
HNO3 Peroxide Digestion	-	20011119-B	-	-	20011119-B	20011119-B
Mercury Digestion	-	20011120-D	-	-	-	-
Total Water Digest	-	-	-	20011120-A	-	-
Lead	mg/L	0.05	-	3.71	-	-
Dry Weight Used	g	0.01	-	50.0	-	-
Initial pH	Units	1.0	-	7.4	-	-
Final pH	Units	1.0	-	4.9	-	-
0.5N Acetic acid volume	mL/L	0.0	-	25.0	-	-
Lead	mg/kg	0.5	-	-	230	37.
Zinc	mg/kg	2.	2800	-	480	100
Mercury	mg/kg	0.01	12.	-	-	-
Moisture	%	0.10	-	9.3	-	-

Legend:

EQL = Estimated Quantitation Limit for routine analysis
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Note : Soil results are expressed as air dry weight basis.
Biota results are expressed on a wet weight basis unless otherwise stated.

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Inorganic Parameters page : 3

PSC Analytical Services
200 Bluewater Road
Bedford, NS Canada B4B 1G9
Tel (902) 420-0203
Toll free (800) 565-7227
Fax (902) 420-8612

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0116158H
Client Project Number : NBF 13300-7

FAX # : 468-9009
Printed : 2001/11/22
Reported : 2001/11/22

Matrix	Soil	Soil	Soil	Soil
Philip ID	01-H074589	01-H074590	01-H074591	01-H074592
Client ID	SS6B	SS6C	SS6C Dup	SS80B
Date Sampled (y/m/d)				
Date Received (y/m/d)	01/11/13	01/11/13	01/11/13	01/11/13
Analyte	Units	EQL	DUP	
HNO3 Peroxide Digestion	-	20011119-B	20011119-B	20011119-B
Lead	mg/kg	0.5	13.	5.3
			5.4	0.7

Legend:

EQL = Estimated Quantitation Limit for routine analysis
nd = not detected above standard EQL
nd() = not detected at the elevated EQL specified due to matrix interferences or sample pre-dilution
- = Parameter not requested in Sample

Note : Soil results are expressed as air dry weight basis.
Biota results are expressed on a wet weight basis unless otherwise stated.

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Inorganic Parameters

page : 4

s.19(1)

PSC Analytical Services

Client : Jacques Whitford Environment Ltd.

200 Bluewater Road

3 Spectacle Lake Drive

Bedford, NS Canada B4B 1G9

Dartmouth

Tel (902) 420-0203

NS B3B 1W8

FAX # : 468-9009

Toll free (800) 565-7227

PSC Project Number : 0116158H

Printed : 2001/11/22

Fax (902) 420-8612

Client Project Number : NBF 13300-7

Reported : 2001/11/22

Matrix	Soil	Soil	Soil	Soil
Philip ID	01-H074593	01-H074594	01-H074595	01-H074596
Client ID	SS80C	SS3B	SS3C	SS5A
Date Sampled (y/m/d)				
Date Received (y/m/d)	01/11/13	01/11/13	01/11/13	01/11/13
Analyte	Units	EQL		
HNO3 Peroxide Digestion	-	20011119-B	20011119-B	20011119-B
Mercury Digestion	-	-	20011120-D	20011120-D
Lead	mg/kg	0.5	0.8	15.
Zinc	mg/kg	2.	-	24.
Mercury	mg/kg	0.01	-	0.07

Legend:

EQL = Estimated Quantitation Limit for routine analysis
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Note : Soil results are expressed as air dry weight basis.
Biota results are expressed on a wet weight basis unless otherwise stated.

page verified

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Inorganic Parameters page : 5

PSC Analytical Services
200 Bluewater Road
Bedford, NS Canada B4B 1G9
Tel (902) 420-0203
Toll free (800) 565-7227
Fax (902) 420-8612

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0116158H
Client Project Number : NBF 13300-7

FAX # : 468-9009
Printed : 2001/11/22
Reported : 2001/11/22

Matrix	Soil	Soil	Soil	Soil
Philip ID	01-H074597	01-H074598	01-H074599	01-H074600
Client ID	SS9A	SS11A	SS12A	SS12A Dup
Date Sampled (y/m/d)				
Date Received (y/m/d)	01/11/13	01/11/13	01/11/13	01/11/13
Analyte	Units	EQL		DUP
HNO3 Peroxide Digestion	-	20011119-B	20011119-B	20011119-B
Mercury Digestion	-	20011120-D	20011120-D	20011121-A
Lead	mg/kg	0.5	70.	16.
Zinc	mg/kg	2.	36.	19.
Mercury	mg/kg	0.01	0.02	0.04

Legend:

EQL = Estimated Quantitation Limit for routine analysis
nd = not detected above standard EQL
nd() = not detected at the elevated EQL specified due to matrix interferences or sample pre-dilution
- = Parameter not requested in Sample

Note : Soil results are expressed as air dry weight basis.
Biota results are expressed on a wet weight basis unless otherwise stated.

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PSC ANALYTICAL SERVICES

0006

Inorganic Parameters

page : 6

s.19(1)

PSC Analytical Services
200 Bluewater Road
Bedford, NS Canada B4B 1G9
Tel (902) 420-0203
Toll free (800) 565-7227
Fax (902) 420-8612

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0116158H
Client Project Number : NBF 13300-7

FAX # : 468-9009
Printed : 2001/11/22
Reported : 2001/11/22

Certificate of Analysis

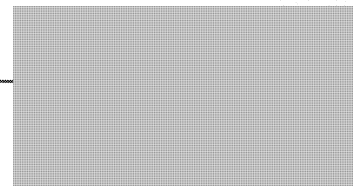
Method Summaries:

- Total Recoverable Metals Digest: Homogenization/Digestion. Ref: USEPA Method #200.2
- Mercury in Soils and Sediments: Digestion/Cold Vapour Atomic Absorption.
Ref: USEPA Method #245.5
- Mercury: Digestion/Cold Vapour Atomic Absorption. Ref: USEPA Method #245.5
- Leachate Extraction: pH 5 Acetic Acid Extraction. Ref: MOEE 347/CGSB 164-GF-IMP
- Major Metals in Aqueous Samples: PE Optima 3000 ICP-OES. Ref: USEPA Method #200.7
- Available Trace Metals in soils/sediments: Nitric/Peroxide Digestion.
Ref: USEPA Method #3050B.

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Approval of Inorganic Parameters:

Inorganics Manager : _____



11/22/2001 THU 16:34 [TX/RX NO 5544] 0006

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JACQUES WHITFORD
PSC ANALYTICAL SERVICES



Inorganic Parameters

page : 1

s.19(1)

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8

PSC Project Number : 0116388H
Client Project Number : NBF 13300-7

FAX # : 468-9009
Printed : 2001/11/28
Reported : 2001/11/28

Matrix	Soil	Soil	Soil
Philip ID	01-H075619	01-H075620	01-H075621
Client ID	Dup 31	Dup 32	SS8B
Date Sampled (y/m/d)			
Date Received (y/m/d)	01/11/20	01/11/20	01/11/20

Analyte	Units	EQL			
HNO3 Peroxide Digestion	-	-	20011123-A	20011123-A	20011123-A
Mercury Digestion	-	-	-	-	20011123-C
Lead	mg/kg	0.5	880	17.	19.
Zinc	mg/kg	2.	900	21.	19.
Mercury	mg/kg	0.01	-	-	0.02

Legend:

EQL = Estimated Quantitation Limit for routine analysis
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Note : Soil results are expressed as air dry weight basis.
Biota results are expressed on a wet weight basis unless otherwise stated.

page verified

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902 468 9009

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Inorganic Parameters

page : 2

s.19(1)

PSC Analytical Services
200 Bluewater Road
Bedford, NS Canada B4B 1G9
Tel (902) 420-0203
Toll free (800) 565-7227
Fax (902) 420-8612

Client : Jacques Whitford Environment Ltd.
3 Spectacle Lake Drive
Dartmouth
NS B3B 1W8
PSC Project Number : 0116388H
Client Project Number : NBF 13300-7

FAX # : 468-9009
Printed : 2001/11/28
Reported : 2001/11/28

Certificate of Analysis

Method Summaries:

- Mercury in Soils and Sediments: Digestion/Cold Vapour Atomic Absorption.
Ref: USEPA Method #245.5
- Available Trace Metals in soils/sediments: Nitric/Peroxide Digestion.
Ref:USEPA Method #3050B.

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Approval of Inorganic Parameters:

Inorganics Manager : _____



APPENDIX F

RPIS CONTAMINATED SITE MODULE

Contaminated Sites Summary

Wednesday, January 16, 2002

RPIS
CS Module

Region: Maritimes

Site Name	Malpeque Harbour Approach Range Rear	Site Number	MB 00065
Site Descriptor	Rear Range	List of Lights Number	1067
Province	P.E.I.	Land Descriptor Unit	81101
Sector	Canadian Coast Guard	Status	Active
		Custodian	F&OCG

Site Location			
Street Address			
City		Postal Code	
Latitude	46-34-40	Longitude	63-43-13

Contaminated Site Name	Lead, zinc and mercury in soil around range light	CS Number	
Status	Under Assessment		

Regional File Number		National File Number	
-----------------------------	--	-----------------------------	--

Location of Contamination	Lead, zinc and mercury contamination was found in soils around LL#1067 and a portion of the former LL#1067 structure.						
Latitude	0	0	0	Longitude	0	0	0

Action Plan	
--------------------	--

Additional Information	Lead based paint was found on the exterior components of LL#1067: siding, trim, staircase, and steel framing. The interior paint of LL#1067 could not be analysed as the sample included asbestos-containing substrate; however, based on past experience it is expected that the interior paint is lead-containing. Asbestos-containing materials were found in the floor and wall board of the interior fourth storey of LL#1067.
-------------------------------	--

Contaminated Sites Summary

Wednesday, January 16, 2002

RPT-3
CS Module

Region: Maritimes

Site Name	Malpeque Harbour Approach Range Front	Site Number	MB 00064
Site Descriptor	Front Range	List of Lights Number	1066
Province	P.E.I.	Land Descriptor Unit	02175
Sector	Canadian Coast Guard	Status	Active
		Custodian	F&OCG

Site Location	On Billhook Island.		
Street Address			
City	Malpeque	Postal Code	
Latitude	46-34-38	Longitude	63-42-54

Contaminated Site Name	Potential Metals and hydrocarbons in soil	CS Number	
Status	Assessed - No Action Required		

Regional File Number		National File Number	
----------------------	--	----------------------	--

Location of Contamination	Lead based paint was found on the LL#1066 daymark. Potential presence of lead based and/or mercury containing paint on the daymarks of LL# 1066 and battery box; potential presence of metal impacts in the soil surrounding the range light; and
---------------------------	---

Latitude	0	0	0	Longitude	0	0	0
----------	---	---	---	-----------	---	---	---

Action Plan	
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Additional Information	potential petroleum hydrocarbon impacts s in the vicinity of: LL# 1066.
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Contaminated Sites Summary

Wednesday, January 16, 2002

RPIS
CS Module

Region: Maritime

Site Name	Malpeque Harbour Range Front	Site Number	MB 00066
Site Descriptor	Front Range	List of Lights Number	1068
Province	P.E.I.	Land Descriptor Unit	02176
Sector	Canadian Coast Guard	Status	Active
		Custodian	F&OCG

Site Location	On Billhook Island.		
Street Address			
City	Malpeque Harbour	Postal Code	
Latitude	46-34-25	Longitude	63-42-48

Contaminated Site Name	Potential Metals on structure and in soil	CS Number	
Status	Assessed - No Action Required		

Regional File Number		National File Number	
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Location of Contamination	Potential presence of lead based and/or mercury containing paint on the daymarks of LL 1068; potential presence of metal impacts in the soil surrounding the existing range light.		
Latitude	0	0	0
Longitude	0	0	0

Action Plan

Additional Information

Contaminated Sites Summary

Wednesday, January 16, 2002

RPIS
CS Module

Region: Maritimes

Site Name	Malpeque Harbour Range Rear	Site Number	M B 00067
Site Descriptor	Rear Range	List of Lights Number	1069
Province	P.E.I.	Land Descriptor Unit	81102
Sector	Canadian Coast Guard	Status	Active
		Custodian	F&OCG

Site Location			
Street Address			
City		Postal Code	
Latitude	46-34-26	Longitude	63-42-45

Contaminated Site Name	Potential Metals on structure and in soil	CS Number	
Status	Assessed - No Action Required		

Regional File Number		National File Number	
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Location of Contamination	Potential presence of lead based and/or mercury containing paint on the daymarks of LL 1069; potential presence of metal impacts in the soil surrounding the existing range light.		
Latitude	0	0	0
Longitude	0	0	0

Action Plan	
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Additional Information	
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APPENDIX G

DETAILED NCS EVALUATION FORM

Site Identification:

Malpeque Harbour Approach Ranges

DETAILED EVALUATION FORM

I CONTAMINANTS CHARACTERISTIC (Maximum Total Score is 33)

Complete Sections A, B, C, and Special Considerations

If answer is an estimate, circle the question mark (?) beside your score; if not an estimate circle the checkmark (✓)

Factors	Scoring Guideline	Site Score ?	Totals ✓
A Degree of Hazard (max. 14) High concern contaminants - high concentration High concern contaminants - low concentration Medium concern contaminants - high concentration Medium concern contaminants - low concentration Low concern contaminants	14 11 8 5 3		14
B Contaminant Quantity (area of volume of site contamination) (max. 10) >10 ha or 1000 m ³ or drums of liquid 2 to 10 ha or 100 to 1000 m ³ <2 ha or 100 m ³	10 6 2		14 Section A max. 14
C Physical State of Contaminants (max. 9) Liquid/gas Sludge Solid	9 7 3	3	6 Section B max. 10
Special Considerations Discretionary addition or subtraction to this category score (Contaminant Characteristics) by up to 6 points based on technical judgment of the user. (Special considerations scores must not cause total score for this category to exceed the maximum (33) or be lower than the minimum (0) allowable.) DETAILED RATIONALE MUST BE DOCUMENTED			3 Section C max. 9
	-6 to +6		0 max. 6

Total Site Score for CONTAMINANT CHARACTERS			
	Add:	Total "✓"	Total "✓+?"
I			
	Section A	14	14
	Section B	6	6
	Section C	3	3
	Special Considerations	0	0
	TOTAL	23	23
			max. 33

Site Identification: Malpeque Harbour Approach Ranges **DETAILED EVALUATION FORM (Cont'd)**

- II EXPOSURE PATHWAYS** (Maximum Total Score is 33)
A Complete Sections A, B, C
Groundwater (Maximum Score is 11)
Score Section 1 (Known) or 2 (Potential), and Section 3.
 If answer is an estimate, circle the question mark (?) beside your score;
 if not an estimate circle the checkmark (✓)

Factors	Scoring Guideline	Site Score ?	Totals ✓
1 Known Contamination of Groundwater at or beyond the Property Boundary (measured contamination of, or known contact with, groundwater (max. 11)) Groundwater significantly exceeds CDWG (by >2x) or known contact of contaminants with groundwater Between 1 and 2x CDWG or probable contact with groundwater Meets Canadian Drinking Water Guidelines	11 6 0		
Section 1 max. 11 0			
OR 2			
If impact on groundwater is not known complete 2			
Potential for Groundwater Contamination (max. 11)			
a) Engineered subsurface containment (max. 4)			
No containment	4		4
Partial Containment	2		
Full Containment	0		
b) Thickness of confining layer over aquifer (max. 1.5)			
3 m or less	1.5	0.75	
3 to 10 m	1		
> 10 m	0		
c) Hydraulic conductivity of the confining layer (max. 1.5)			
>10 ⁻⁴ cm/sec	1.5	0.75	
10 ⁻⁴ to 10 ⁻⁶ cm/sec	1		
<10 ⁻⁶ cm/sec	0.5		
d) Annual rainfall (max. 1)			
>1,000 mm	1	1	
600 mm	0.6		
400 mm	0.4		
200 mm	0.2		
e) Hydraulic conductivity of aquifer(s) of concern (max. 3)			
>10 ⁻² cm/sec	3	1.5	
10 ⁻² to 10 ⁻⁴ cm/sec	1.5		
<10 ⁻⁴ cm/sec	0.5		
Section 2 max. 11 8			

3 Special Considerations

Discretionary addition or subtraction to this sub-category score (Groundwater Pathway) by up to 4 points based on technical judgment of the user. (Special considerations scores must not cause total score for this sub-category to exceed the maximum (11) or be lower than the minimum (0) allowable.)

DETAILED RATIONALE MUST BE DOCUMENTED

-4 to +4

0

Section 3
max. 4

A Groundwater Total

Add:

Section 1 or 2	Total "✓"	Total "?"	Total "✓"+"?"
Section 3	5	3	8
TOTAL	0	0	0
	5	3	8
			max. 11

Site Identification: Malpeque Harbour Approach Ranges **DETAILED EVALUATION FORM (Cont'd)**

II EXPOSURE PATHWAYS (Cont'd)

B Surface Water (Maximum Score is 11)
Score **Section 1 (Known)** or **2 (Potential)**, and **Section 3**.

Factors	Scoring Guideline	Site Score		Totals
		?	✓	
1	Observed or Measured Contamination of Water/Effluent Discharged from Site (max. 11)			
	Known or strongly suspected to exceed CWQG by >2x	11		
	Known or strongly suspected to be between 1 and 2x CWQG	6		
	Meets Canadian Water Quality Guidelines	0		
	If impact on surface water is not known complete 2			0
				Section 1 max. 11
OR 2	Potential for Surface Water Contamination (max. 11)			
	a) Surface containment (max. 5)			
	No containment	5		5
	Partial Containment	3		
	Full Containment	0.5		
	b) Distance to perennial surface water (max. 3)			
	0 to <100 m	3		3
	100-300 m	2		
	>300 m	0.5		
	c) Topography (max. 1.5)			
	Contaminants above ground level and slope is steep	1.5		
	Contaminants at or below ground level and slope is steep	1.2		1.2
	Contaminants above ground level and slope is flat	0.8		
	Contaminants at or below ground level and slope is flat	0		
	d) Run-off potential (see nomograph at end of Appendix D) (max. 1)			
	>1,000 mm rainfall and low permeability surface material	1	0.5	
	500-1000 mm rainfall and moderately permeable surface material	0.6		
	<500 mm rainfall and highly permeable surface material	0.2		
	e) Flood potential (max. 0.5)			
	1 in 2 years	0.5	0.25	
	1 in 10 years	0.3		
	1 in 50 years	0.1		
				9.95
				Section 2 max. 11

Special Considerations

Discretionary addition or subtraction to this sub-category score (Surface Water Pathway) by up to 4 points based on technical judgment of the user. (Special considerations scores must not cause total score for this sub-category to exceed the maximum (11) or be lower than the minimum (0) allowable.)

DETAILED RATIONALE MUST BE DOCUMENTED

-4 to +4

0

Section 3
max. 4

B	Surface Water Total	Add:	Section 1 or 2	Total "✓"	Total "?"	Total "✓" + "?"	
				9.2			
				Section 3			0
				TOTAL			9.2
							0.75
							9.95
					0.75	9.95	
						max. 11	

Site Identification: Malpeque Harbour Approach Ranges **DETAILED EVALUATION FORM (Cont'd)**

II EXPOSURE PATHWAYS (Cont'd)

C Direct Contact (Maximum Score is 11)
Score **Section 1 (Known)** or **2 (Potential)**, and **Section 3**.

Factors	Scoring Guideline	Site Score		Totals
		?	✓	
1 Known Contamination of Media Off-site (max. 11) Known contamination of media (soil, sediment, air) off-site due to direct contact with contaminated soil, dust, air etc. (vector transported should also be considered) Strongly suspected contamination of media (soil, sediment, air) off-site No contamination of media off-site If impact due to direct contact is not known complete 2	11 6 0			0 Section 1 max. 11
OR 2 Potential for Direct Human and/or animal Contact (max. 11) a) Airborne Emissions (gases, vapour, contaminated dust, etc.) (max. 5) Known or suspected airborne emissions impacting on neighbouring properties (see User's Guide) Airborne emissions generally restricted to site No airborne emissions b) Accessibility of Site (Ability to Contact Materials) (max. 4) Limited barriers to prevent site access; contaminants not covered Moderate accessibility or no intervening barriers; contaminants are covered Controlled access or remote location and contaminants are covered c) Hazardous soil gas migration from the site (max. 2) Contaminants are putrescible and soil permeability is high Site contaminants are putrescible but soil permeability is low, and/or groundwater is <2 m from surface No putrescible contaminants at the site	5 3 0 4 3 0 2 1 0		0 4	Section 2 max. 11
3 Special Considerations Discretionary addition or subtraction to this sub-category score (Direct Contact Pathway) by up to 4 points based on technical judgment of the user. (Special considerations scores must not cause total score for this sub-category to exceed the maximum (11) or be lower than the minimum (0) allowable.) DETAILED RATIONALE MUST BE DOCUMENTED	-4 to +4			0 Section 3 max. 4

		Total "1"		Total "2"		Total "3"	
C	Direct Contact Total	Add:		Section 1 or 2		Section 3	
				4		0	
				0		0	
				TOTAL		4	
				Total "1" + "2" + "3"		max. 11	

II		Total Site Score for EXPOSURE PATHWAYS		Add:			
	Groundwater	5	3	8			
	Surface Water	9.2	0.75	9.95			
	Direct Contact	4	0	4			
	TOTAL	18.2	3.75	21.95			
							max. 33

Site Identification:

Malpeque Harbour Approach Ranges

DETAILED EVALUATION FORM (Cont'd)

III RECEPTORS (Maximum Total Score is 34)

Complete Section A and B

A Human and Animal Uses (Maximum score is 18)

Score **Section 1 (Known)** or **2 (Potential)**, and **Section 3**.

If answer is an estimate, circle the question mark (?) beside your score;
if not an estimate circle the checkmark (✓)

Factors	Scoring Guideline	Site Score		Totals
		?	✓	
1 Known Impact on Humans or Animals (max. 18)				0
Known adverse impact on humans or domestic animals as a result of the contaminated site (see User's Guide)	18			Section 1 max. 18
Known adverse effect on humans or domestic animals	15			
Strongly suspected adverse effect on humans or domestic animals				Class 1
If adverse effect on humans is not known complete 2				
OR 2 Potential for Impact on Humans or Animals (max. 18)				
a) Drinking Water Supply (max. 9) (groundwater or surface water; private, commercial or municipal supply) Complete Section i) (Known) OR ii) (Potential)				
i) Known impact on drinking water supply (max. 9) (see User's Guide)				
Drinking water supply is known to be adversely affected as a result of site contamination	9			
Known contamination of drinking water supply (to levels exceeding CDWG)	7			
Strongly suspected contamination of drinking water supply	0			
Drinking water supply is known not to be contaminated				
ii) Potential for impact on drinking water supply (max. 9)				
■ Proximity to drinking water supply (max. 6)				
0 to <100 m	6			
100 to <300 m	5			
300 m to <1 km	4			
1 to 5 km	3			
■ "Availability" of alternate drinking water supply (max. 3)				
Alternate drinking water supply is not available	3			
Alternate drinking water supply difficult to obtain	2			
Alternate drinking water supply available	0.5			

Factors	Scoring Guideline	Site Score																								
		?	✓ Totals																							
b) Other Water Resources (max. 4) (groundwater or surface water)																										
Complete i) (Known) OR ii) (Potential)																										
i) Known Impact of water resources (max. 4) (See User's Guide) Water resources (used for recreational purposes, commercial food preparation, livestock watering, irrigation and other food chain uses) is known to be adversely affected as a result of site contamination	4 3 0																									
If impact on water resource is not known, complete ii)																										
ii) Potential for impact on water resources (max. 4)			2																							
■ Proximity to water resources used for activities listed above (max. 2)	2 1.5 1 0.5																									
0 to <100 m																										
100 to <300 m																										
300 m to < 1km																										
1 to 5 km																										
■ Use of water resources (max. 2)																										
If multiple uses, give highest score automatically (use following table)																										
<table><tr><th rowspan="2">Water Use</th><th colspan="2">Frequency of Use</th></tr><tr><th>Frequent</th><th>Occasional</th></tr><tr><td>Recreational (swimming, fishing, ect.)</td><td>2</td><td>1</td></tr><tr><td>Commercial food preparation</td><td>1.5</td><td>0.8</td></tr><tr><td>Livestock watering</td><td>1</td><td>0.5</td></tr><tr><td>Irrigation</td><td>1</td><td>0.5</td></tr><tr><td>Other domestic or food chain uses</td><td>0.5</td><td>0.3</td></tr><tr><td>Not currently used but likely future use</td><td>0.5</td><td>0.2</td></tr></table>				Water Use	Frequency of Use		Frequent	Occasional	Recreational (swimming, fishing, ect.)	2	1	Commercial food preparation	1.5	0.8	Livestock watering	1	0.5	Irrigation	1	0.5	Other domestic or food chain uses	0.5	0.3	Not currently used but likely future use	0.5	0.2
Water Use	Frequency of Use																									
	Frequent	Occasional																								
Recreational (swimming, fishing, ect.)	2	1																								
Commercial food preparation	1.5	0.8																								
Livestock watering	1	0.5																								
Irrigation	1	0.5																								
Other domestic or food chain uses	0.5	0.3																								
Not currently used but likely future use	0.5	0.2																								

Site Identification: Malpeque Harbour Approach Ranges **DETAILED EVALUATION FORM (Cont'd)**

III RECEPTORS (Cont'd)

A Human and Animal Uses (Cont'd)

Factors	Scoring Guideline	?	✓	Totals
c) Direct Human Exposure (max. 5)				
Complete i) (Known) OR ii) (Potential)				
i) Known contamination of land used by humans (max. 5) (see User's Guide)				
* Known contamination of land used for agricultural or residential/parkland/school purposes above AG or R/P EQC values	5			3.5
* Known contamination of land used for commercial or industrial purposes above C/I EQC values	3.5			
* Land is known not to be contaminated	0			
If adverse effect on humans is not known complete ii)				
ii) Potential human exposure through land use (give highest score to worst case scenario) (max. 5)				
■ Use of land at and surrounding site				
Determine use(s) of land at and surrounding site and assign score using following table:				
	Distance from Site			
	0-300 m	300 m- <1 km	1 km- 5 km	
Land Use				
Residential	5	4.5	3	
Agricultural	5	4	2.5	
Parkland/School	4	3	1.5	
Commercial/Industrial	3	1	0.5	
				11
				Section 2 max. 18

Special Considerations

Discretionary addition or subtraction to this sub-category (Impact on Human and Animal Receptors) by up to 5 points based on technical judgment of the user. (Special considerations scores must not cause total score for this sub-category to exceed the maximum (18) or be lower than the minimum (0) allowable.)

DETAILED RATIONALE MUST BE DOCUMENTED

-5 to +5

0
Section 2
max. 18

A Total Human and Animal Receptors

Add:

Section 1 or 2	Total "✓"	Total "2"	Total "✓" + "2"
Section 3	11	0	11
TOTAL	0	0	0
	11		11
			max. 18

Site Identification: Malpeque Harbour Approach Ranges **DETAILED EVALUATION FORM (Cont'd)**

III RECEPTORS (Cont'd)

B Environmental Receptors (Maximum Score is 16)
Score **Section 1 (Known)** or **2 (Potential)**, and **Section 3**.

Factors	Scoring Guideline	Site Score		Totals
		?	✓	
1 Known Adverse Impact on the Environment as a Result of the Contaminated Site (max. 16)				
Known adverse impact on sensitive environment	16			0 Section 1 max. 16
Evidence of stress on aquatic species, or vegetative stress on trees, crops or plant life located on properties neighbouring the site	14			
Strongly suspected adverse impact on sensitive environment	12			
If impact on environment is not known complete 2				
OR 2 Potential for Impact on Sensitive Environments (max. 16)				
a) Distance from the site to the nearest sensitive environment (max. 10) e.g., sensitive aquatic environment, nature preserve, habitat for endangered species, sensitive forest reserves, national parks or forests, etc.)			10	13 Section 2 max. 16
0 to <500 m	10			
500 m to <2 km	6			
2 to <5 km	2			
5 to 10 km	0.5			
b) Groundwater (max. 6) Distance to an important or susceptible groundwater resource (e.g. recharge area)			3	0 Section 3 max. 5
0 to <500 m	6			
500 m to <2 km	4			
2 to <5 km	2			
5 to 10 km	1			
Special Considerations				
Discretionary addition or subtraction to this sub-category (Environmental Receptors) by up to 5 points based on technical judgment of the user. (Special considerations scores must not cause total score for this sub-category to exceed the maximum (16) or be lower than the minimum (0) allowable.)				
DETAILED RATIONALE MUST BE DOCUMENTED				
	-5 to +5			

B	Total Environmental Receptors	Add:	Total "✓"		Total "✓+?"	
			Section 1 or 2		3	
			Section 3		0	
			TOTAL		3	
					max. 16	
III	Total Site Score for RECEPTORS	Add:	Human & Animal Use		11	
			Environmental Receptors		3	
			TOTAL		24	
					max. 33	

Site Identification: Malpeque Harbour Approach Ranges

DETAILED EVALUATION FORM (Cont'd)

FINAL SCORE SHEET AND SITE CATEGORIES

Factor Categories	Category Score (CS) ("✓+?")	Estimated Score (ES) ("2")	Total Category Score (CS)	Total Estimated Score (ES)
I CONTAMINANT CHARACTERISTICS (33)	23	0	Total → 23	± 0
II EXPOSURE PATHWAYS (33)				
A Groundwater (11)	8	3		
B Surface Water (11)	9.95	0.75		
C Direct Contact (11)	4	0		
Total	21.95	3.75	Total → 21.95	± 3.75
III RECEPTORS (34)				
A Human and Animal (18)	11	0		
B Environment (16)	13	3		
Total	24	3	Total → 24	± 3
			69	± 7

TOTAL SCORE FOR THE SITE (TS)
(Sum of scores marked "✓" and "2", rounded to nearest whole number)

ESTIMATED SCORE FOR SITE (ES)
(Sum of scores marked "2", i.e., score estimated or unknown)

TOTAL SCORE	CLASS	RISK POTENTIAL	ACTION REQUIRED
70-100	Class 1	High	Yes
50-69	Class 2	Medium	Likely
38-49	Class 3	Medium Low	May Be
<37	Class N	Low	Not Likely

CLASSIFICATION (1, 2, 3, or N)
If ES ≥ 15, then site is categorized as I
(insufficient information to classify site)

2

APPENDIX H

FIELD OBSERVATIONS

Table H1 - Soil Descriptions

Sample Location	Depth (mbgs)	Designation A, B, C	Colour	Description	Fill/Till/Bedrock	Stains Y/N	Odours Y/N	Debris Type Present	VOC Reading ppm
SS-1	0-0.15	A	reddish brown	rootmat and silty sand	Fill	N	N	None	0
	0.15-0.3	B	reddish brown	silty sand and organics	Fill	N	N	None	0
	0.3-0.45	C	reddish brown	silty sand	Fill	N	N	None	0
SS-2	0-0.15	A	reddish brown	rootmat and silty sand	Fill	N	N	None	0
	0.15-0.3	B	reddish brown	silty sand and organics	Fill	N	N	None	0
	0.3-0.45	C	reddish brown	silty sand	Fill	N	N	None	0-2
SS-3	0-0.15	A	reddish brown	rootmat and silty sand	Fill	N	N	None	0
	0.15-0.3	B	reddish brown	silty sand and organics	Fill	N	N	None	0
	0.3-0.45	C	reddish brown	silty sand	Fill	N	N	None	0-2
SS-4	0-0.15	A	reddish brown	rootmat and silty sand	Fill	N	N	None	0
	0.15-0.3	B	reddish brown	silty sand and organics	Fill	N	N	None	4-5
	0.3-0.45	C	reddish brown	silty sand	Fill	N	N	None	0
SS-5	0-0.15	A	reddish brown	rootmat and silty sand	Fill	N	N	None	3-4
	0.15-0.3	B	reddish brown	silty sand and organics	Fill	N	N	None	0
	0.3-0.45	C	reddish brown	silty sand	Fill	N	N	None	0
SS-6	0-0.15	A	reddish brown	rootmat and silty sand	Fill	N	N	brick/glass/dishes	0
	0.15-0.3	B	reddish brown	silty sand and organics	Fill	N	N	brick/glass/dishes	0
	0.3-0.45	C	reddish brown	silty sand	Fill	N	N	brick/glass/dishes	0
SS-7	0-0.15		reddish brown	silty sand, sandy silt, some organics	Fill/Till	N	N	None	2-3
SS-8	0-0.15	A	reddish brown	rootmat and silty sand	Fill	N	N	None	0
	0.15-0.3	B	reddish brown	silty sand and organics	Fill	N	N	None	0
	0.3-0.45	C	reddish brown	silty sand	Fill	N	N	None	0
SS-9	0-0.15	A	reddish brown	rootmat and silty sand	Fill	N	N	None	0
	0.15-0.3	B	reddish brown	silty sand and organics	Fill	N	N	None	0
	0.3-0.45	C	reddish brown	silty sand	Fill	N	N	None	0
SS-11	0-0.15	A	reddish brown	rootmat and silty sand	Fill	N	N	None	0
	0.15-0.3	B	reddish brown	silty sand and organics	Fill	N	N	None	0
	0.3-0.45	C	reddish brown	silty sand	Fill	N	N	None	0

Table H1 - Soil Descriptions

Sample Location	Depth (mbgs)	Designation A, B, C	Colour	Description	Fill/Till/Bedrock	Stains Y/N	Odours Y/N	Debris Type Present	VOC Reading ppm
SS-12	0-0.15	A	reddish brown	rootmat and silty sand silty sand and organics silty sand	Fill	N	N	None	0
	0.15-0.3	B	reddish brown		Fill	N	N	None	1-2
	0.3-0.45	C	reddish brown		Fill	N	N	None	0
SS-80	0-0.15	A	reddish brown	organics and silty sand silty sand to sandy silt silty sand to sandy silt	Fill	N	N	Paint can	0
	0.15-0.3	B	reddish brown		Fill	N	N	None	0
	0.3-0.45	C	reddish brown		Fill	N	N	None	0
SS-20	0-0.15	A	lt br to red. br	sand some org. trace silt sand some org. trace silt sand some org. trace silt	Beach deposit	N	N	None	5
	0.15-0.3	B	lt br to red. br		Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br		Beach deposit	N	N	None	0
SS-21	0-0.15	A	lt br to red. br	sand some org. trace silt sand some org. trace silt sand some org. trace silt	Beach deposit	N	N	None	0
	0.15-0.3	B	lt br to red. br		Beach deposit	N	N	None	5
	0.3-0.45	C	lt br to red. br		Beach deposit	N	N	None	8
SS-22	0-0.15	A	lt br to red. br	sand some org. trace silt sand some org. trace silt sand some org. trace silt	Beach deposit	N	N	None	5
	0.15-0.3	B	lt br to red. br		Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br		Beach deposit	N	N	None	0
SS-23	0-0.15	A	lt br to red. br	sand some org. trace silt sand some org. trace silt sand some org. trace silt	Beach deposit	N	N	None	0
	0.15-0.3	B	lt br to red. br		Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br		Beach deposit	N	N	None	10
SS-24	0-0.15	A	lt br to red. br	sand some org. trace silt sand some org. trace silt sand some org. trace silt	Beach deposit	N	N	None	0
	0.15-0.3	B	lt br to red. br		Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br		Beach deposit	N	N	None	0
SS-25	0-0.15	A	lt br to red. br	sand some org. trace silt sand some org. trace silt sand some org. trace silt	Beach deposit	N	N	None	0
	0.15-0.3	B	lt br to red. br		Beach deposit	N	N	None	4-5
	0.3-0.45	C	lt br to red. br		Beach deposit	N	N	None	0
SS-26	0-0.15	A	lt br to red. br	sand some org. trace silt sand some org. trace silt sand some org. trace silt	Beach deposit	N	N	None	2
	0.15-0.3	B	lt br to red. br		Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br		Beach deposit	N	N	None	0
SS-27	0-0.15	A	lt br to red. br	sand some org. trace silt sand some org. trace silt sand some org. trace silt	Beach deposit	N	N	None	5
	0.15-0.3	B	lt br to red. br		Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br		Beach deposit	N	N	None	0

Table H1 - Soil Descriptions

Sample Location	Depth (mbgs)	Designation A, B, C	Colour	Description	Fill/Till/Bedrock	Stains Y/N	Odours Y/N	Debris Type Present	VOC Reading ppm
SS-28	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
SS-29	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
SS-30	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
SS-31	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
SS-40	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	5
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
SS-41	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	5
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	5-6
SS-42	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	10
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	4-5
SS-43	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	4-5
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
SS-44	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	5
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
SS-45	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	5
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0

Table H1 - Soil Descriptions

Sample Location	Depth (mbgs)	Designation A, B, C	Colour	Description	Fill/Till/Bedrock	Stains Y/N	Odours Y/N	Debris Type Present	VOC Reading ppm
SS-46	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
SS-47	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
SS-48	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	5-7
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
SS-49	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	8-10
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
SS-50	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
SS-51	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
SS-60	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
SS-61	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
SS-62	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
SS-63	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	2-4
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0

Table H1 - Soil Descriptions

Sample Location	Depth (mbgs)	Designation A, B, C	Colour	Description	Fill/Till/Bedrock	Stains Y/N	Odours Y/N	Debris Type Present	VOC Reading ppm
SS-64	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
SS-65	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
SS-66	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
SS-67	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
SS-68	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	4-5
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
SS-69	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
SS-70	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	2-3
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	5
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
SS-71	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
SS-100	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
SS-101	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0

Table H1 - Soil Descriptions

Sample Location	Depth (mbgs)	Designation A, B, C	Colour	Description	Fill/Till/Bedrock	Stains Y/N	Odours Y/N	Debris Type Present	VOC Reading ppm
SS-101	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
SS-102	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
SS-103	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
SS-104	0-0.15	A	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.15-0.3	B	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0
	0.3-0.45	C	lt br to red. br	sand some org. trace silt	Beach deposit	N	N	None	0

Notes:

si sa to sa si some org. = silty sand to sandy silt some organics

lt. br. to red. br. = light brown to reddish brown

sand some org trace silt = sand some organics and trace silt

VOC readings obtained with a Gastector 1238ME calibrated with n-hexane.